

## **7 HIGH-SPEED TRAIN NETWORK AND ALIGNMENT ALTERNATIVES COMPARISONS**

### **7.1 Introduction**

#### **7.1.1 Purpose and Content of This Chapter**

The purpose of this chapter is to summarize and compare the physical and operational characteristics and potential environmental consequences associated with different combinations of alignment alternatives that comprise the HST Network Alternatives, as well as differences among alignment alternatives and potential station location options. This chapter summarizes potential environmental consequences for each of 21 representative network alternatives for the environmental resource areas where relative differences were identified (refer to Chapter 3 under Affected Environment, Environmental Consequences, and Mitigation Strategies for a comprehensive presentation of potential environmental consequences in each environmental resource area for each alignment alternative). The 21 representative network alternatives present a range of reasonable alternatives among the three basic approaches for linking the Bay Area and Central Valley: Altamont Pass (11 network alternatives); Pacheco Pass (6 network alternatives); and Pacheco Pass with Altamont Pass (local service) (4 network alternatives).

For many of the environmental topics discussed in this chapter, the quantities presented represent areas within which potential impacts might occur. For example, the area of floodplains includes all floodplains within 100 ft (30.5 m) of either side of the centerline of the alignment considered; whereas the right-of-way necessary for the improvements considered is smaller (e.g., only 25 ft [7.6 m] on either side of the centerline for the HST infrastructure). Therefore the magnitude of potential impacts reported in this document is considerably larger than the actual impacts that would be expected from the HST system within the study area.

#### **7.1.2 Organization of This Chapter**

The network alternatives and alignment alternatives comparisons are presented in tabular form. The station location options are presented individually and compared where multiple options are considered for the same general station area. The network alternatives, alignment alternatives, and station location options are briefly described in the tables and illustrated on the associated maps. For each alternative comparison, the following summary information is presented and compared where relative differences were identified.

- Physical/operational characteristics.
  - Alignment.
  - Length.
  - Capital cost.
  - Travel time.
  - Ridership.
  - Constructability.
  - Operational issues.
- Potential environmental impacts.
  - Transportation and related topics (travel conditions, noise and vibration).

- Human environment (land use and community impacts, farmlands and agriculture, aesthetics and visual resources, and socioeconomics).
- Cultural resources (archaeological resources, historical properties) and paleontological resources.
- Natural environment (geology and seismic hazards, hydrology and water resources, and biological resources and wetlands).
- Section 4(f) and 6(f) resources (certain types of publicly owned parklands, recreation areas, wildlife/waterfowl refuges, and historical sites).

The environmental topics for traffic, energy and air quality are not included in this chapter. The network alternatives have the potential to reduce overall air pollution, total energy consumption, and traffic congestion as compared to the No Project Alternative. The representative base HST forecast would result in a reduction of 22 million barrels of oil and 17.6 billion pounds of CO<sub>2</sub> emissions annually by 2030, as compared to the No Project Alternative. Diversions from the automobile to HST could lead to a projected 5% statewide reduction in vehicle miles traveled (VMT) on the highway system, with VMT reductions of between 7% and 12% in Bay Area and Central Valley counties.

The network alternatives with the highest ridership levels show the greatest reductions in VMT on the roadways in the region. The reduction in VMTs results in a corresponding reduction in vehicular emissions, energy consumption, and traffic. Therefore, in this chapter ridership is a proxy for traffic, energy and air quality benefits since the network alternatives with the highest ridership would have the greatest traffic, energy and air quality benefits.

## 7.2 Network Alternatives

The HST Network Alternatives represent different ways to implement the HST system in the study region along combinations of HST Alignment Alternatives and station location options. The HST system would continue outside the study region to the major metropolitan areas in the state, as described in the statewide program EIR/EIS (California High-Speed Rail Authority and Federal Railroad Administration 2005). Because there are many possible combinations of alignment alternatives and station location options, 21 representative network alternatives were selected (Section 2.5 and Table 2.5-1) and the findings for these alternatives are presented in tabular form in the following sections. Note that many other possible network combinations of alignment alternatives are possible. The following network alternatives have been selected as a representative sample to help identify major distinctions between network options and to define major tradeoffs among the possible networks for the Bay Area to Central Valley Region. The network alternatives vary in their ability to meet the purpose and need and objectives of the HST system and provide additional data to inform the future identification of preferred alignment alternatives and station location options. Although HST Alignment Alternatives and station location options were screened and evaluated to identify those that are likely to be reasonable and practicable and meet the project's purpose and need, the representative HST Network Alternatives have not yet been so evaluated. The network alternatives were developed to enable an evaluation and comparison of how various combinations of alignment alternatives would meet the project's purpose and need and how each would perform as a HST network (e.g., travel times between various station locations, anticipated ridership, operating and maintenance costs, energy consumption, and auto trip diversions). The different system characteristics as well as environmental factors of the network alternatives present complex choices that will be better supported and informed following public review and comment on this document.



### 7.2.1 Altamont Pass Alternatives

#### A. SAN FRANCISCO AND SAN JOSE TERMINI

The San Francisco and San Jose termini network alternative is shown in Figure 7.2-1 and described in Table 7.2-1. The segments used for this representative alternative are Caltrain Corridor (San Francisco to Dumbarton), Dumbarton (high bridge)<sup>1</sup>, Niles/I-880 (Niles Junction to San Jose via I-880)<sup>2</sup>, East Bay Connection (Dumbarton/Niles XS), UPRR (Niles to Altamont), Tracy Downtown (UPRR Connection), and UPRR (Central Valley).

**Table 7.2-1**  
**Altamont Pass: San Francisco and San Jose Termini (Base Case for Altamont Pass)**

Physical/Operational Characteristics	
<b>Network Alternative Description</b>	From San Francisco to Redwood City, this network alternative would use the existing Caltrain rail right-of-way and would cross the San Francisco Bay in the Dumbarton corridor. To San Jose, the Niles/I-880 alignment alternative would be used south of Niles. The Altamont Pass would use the UPRR alignment alternative through downtown Tracy, and the Central Valley would use the UPRR N/S alignment alternative. Station location options considered for this alternative are Transbay Transit Center, Millbrae/SFO, Redwood City (Caltrain), Fremont (Warm Springs), San Jose (Diridon), Pleasanton (I-680/Bernal Road), Tracy (Downtown), Modesto (Downtown), and Merced (Downtown).
<b>Length</b>	203.34 mi (327.24 km)
<b>Cost (dollars)</b>	\$12.7 billion
<b>Express Travel Times (minutes)</b>	SF–LA=2:36; SF–Sac=1:06; SF–Fresno=1:18; SJ–LA=2:19 ; SJ–Sac=0:49; SJ–Fresno=1:01; Livermore–LA=2:06; Tracy–LA=1:59; SF–Tracy=0:42; SJ–Tracy=0:25.
<b>Ridership</b>	This network alternative would directly serve downtown San Francisco and SFO, San Jose, the I-580 corridor, and a portion of the I-880 corridor, and the Central Valley and would have high ridership and revenue potential. Total ridership and revenue for the statewide HST system with this network alternative is forecast to be 87.9–116 million passengers and \$2.84–\$3.8 billion per year by 2030 <sup>3</sup> .
<b>Constructability</b>	Constructing a new bridge crossing along the Dumbarton corridor would involve major construction activities in sensitive wetlands, saltwater marshes, and aquatic habitat. Special construction methods and mitigations would be required. Portions of this network alternative include alignments in or along operating commuter and intercity rail lines. Maintaining operations on the existing commuter and intercity rail service while constructing grade separations, tunnels, elevated sections, and stations would involve considerable construction issues/challenges. However, the HST infrastructure could be constructed incrementally to minimize impact to existing operations.

<sup>1</sup> Does not include “Dumbarton Wye South to Caltrain” segment.

<sup>2</sup> Does not include Niles Junction to Niles Wye S (“Niles/I-880 5A”) segment.

<sup>3</sup> The “Base Case” network alternative for the Altamont Pass and Pacheco Pass show a range for ridership and revenue forecasts where the “low-end” is the base forecast and the “high-end” is the high-end sensitivity analysis. For all other network alternatives, ridership and revenue numbers are only shown for the base case (low-end) assumptions.





**Figure 7.2-1  
Network Alternatives  
Altamont Pass  
San Francisco and San Jose Termini**



**Table 7.2-1**  
**Altamont Pass: San Francisco and San Jose Termini (Base Case for Altamont Pass)**

<b>O &amp; M Cost (dollars per year)</b>	\$1,099 million
<b>Operational Issues</b>	<p>Average Speed</p> <p>SF–LA=168.8 mph (281.2kph); SF–Sac=129.5 mph (215.8 kph); SF–Fresno=148.0 mph (246.7 kph); SJ–LA=178.7 mph (297.9 kph); SJ–Sac=144.1 mph (240.2 kph); SJ–Fresno=165 mph (275 kph); Livermore–LA=182.9 mph (304.8 kph); Tracy–LA=183.4 mph (305.7 kph); SF–Tracy=107.1 mph (178.5 kph); SJ–Tracy=120.7 (201.2 kph).</p> <p>Maximum Speed</p> <p>SF–LA=210 mph (350 kph); SF–Sac=198 mph (330 kph); SF–Fresno=210 mph (350 kph); SJ–LA=210 mph (350 kph); SJ–Sac=198 mph (330 kph); SJ–Fresno=210 mph (350 kph); Livermore–LA=210 mph (350 kph); Tracy–LA=210 mph (350 kph); SF–Tracy=169.2 mph (282 kph); SJ–Tracy=180 mph (300 kph).</p> <p>This network alternative would require the system to split in two separate directions to serve both San Jose and San Francisco, given a constant number of trains. This decreases the frequency of service from southern California to these stations by a factor of two as compared to network alternatives using the Pacheco Pass alignment alternatives. Based on forecasted travel demand, two-thirds of the trains would be directed to San Francisco and one-third of the trains would be directed to San Jose. HST operations would need to be coordinated and integrated with Caltrain service on the San Francisco Peninsula and ACE service in the I-580 corridor.</p>
<b>Potential Environmental Impacts</b>	
<b>Travel Conditions</b>	<p>This network alternative would cross the San Francisco Bay in the Dumbarton corridor. The Caltrain corridor Alignment would bring direct HST service up the San Francisco Peninsula to downtown San Francisco, with potential stations in downtown San Francisco, at SFO (Millbrae), a mid-Peninsula station at Redwood City, an East Bay station at Fremont (Warm Springs), a South Bay station at San Jose (Diridon), a Tri-Valley station at Pleasanton (I-680/Bernal Road), a downtown station in Tracy, and Central Valley stations in Modesto and Merced. This network alternative would increase connectivity and accessibility to San Francisco, the northern peninsula and SFO (the hub international airport for northern California), southern Alameda County, San Jose, the I-580 corridor and Tri-Valley area, and the Central Valley. This network alternative would provide a safer, more reliable, energy-efficient intercity mode along the northern part of the San Francisco Peninsula, while improving the safety, reliability, and performance of the regional commuter service. This network alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic. The fully grade-separated Caltrain corridor north of Redwood City would improve local traffic flow and reduce air pollution at existing rail crossings. There would also be some grade separation benefits in the UPRR in the I-580 corridor and UPRR N/S alignment alternative through the Central Valley. This network alternative would not provide direct HST service to Oakland, Oakland International Airport, or South Santa Clara County.</p>
<b>Noise and Vibration:</b> <sup>i</sup> High, medium, or low potential impacts	<p>Medium potential for noise impacts for the overall alternative, with a high potential for noise impacts in the Dumbarton corridor. Medium potential for vibration impacts for the overall alternative. Medium potential for vibration impacts from San Francisco/San Jose to downtown Tracy, and an overall low potential in the Central Valley, with the exception of urban areas.</p>

**Table 7.2-1**  
**Altamont Pass: San Francisco and San Jose Termini (Base Case for Altamont Pass)**

	Along the Caltrain corridor from Redwood City to San Francisco, there would be an increase in noise levels due to increased frequency of trains. There would be a reduction in noise levels due to the elimination of horn noise and gate noise from existing services as a result of the grade separations at existing grade crossings.
<b>Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice</b>	<p>Compatibility: Majority of network alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway right-of-way. It exhibits low compatibility where it does not follow a transportation right-of-way in the Altamont Pass area. It exhibits a medium to high compatibility where it crosses the San Francisco Bay, in Fremont along the more narrow Centerville line, and in the Shinn area. It has a medium compatibility in the Lathrop, Manteca, Modesto and Merced areas.</p> <p>Environmental Justice: This network alternative has medium environmental justice rating for the Caltrain Corridor (north of Redwood City) and the East Bay alignment to San Jose and low environmental justice rating for the UPRR alignment from Niles Canyon to the Central Valley. Environmental justice is rated as medium in the Central Valley, except in the Manteca area, where the rating is low.</p> <p>Community: This network alternative would not affect community cohesion, given that the majority of the alignment is within or immediately adjacent to an existing major rail or highway right-of-way.</p> <p>Property: This network alternative has the potential for high property impacts in the Niles Canyon, Shinn, and Manteca areas, where additional right-of-way would be required.</p>
<b>Aesthetics and Visual Resources:</b> General impacts and rating.	Segments visual ratings: (1) Caltrain – San Francisco to Dumbarton =low; (2) Niles Junction to San Jose =medium; (3) UPRR =medium; (4) Tracy Downtown =low (5) Dumbarton High Bridge =medium; and (6) UPRR N/S =low. Overall network alternative rating is low to medium
<b>Farmlands:</b> <sup>ii</sup> Ac (ha) potentially affected	<p>Farmland: 764.2 ac (309.28 ha).</p> <p>Impact up to 429.1 ac (173.65 ha) of prime farmland. The majority of potential farmland impacts would occur along the Tracy and the UPRR (North/South) segments. Overall, this network alternative along with the San Francisco, Oakland, and San Jose Termini would have the greatest potential impact on farmland in the Altamont Pass network alternatives. The difference in overall farmland impacts in the Altamont Pass network alternatives is less than 9 ac (3.6 ha).</p>
<b>Cultural Resources and Paleontological Resources:</b> <sup>iii</sup> Potential presence of historical resources in area of potential effect	<p>There are 151 known cultural resources.</p> <p>This network alternative extends through numerous historic districts in San Francisco. Historic properties and buildings dating from the 1900s are within the area of potential effects, along with water delivery systems and canals dating from the 1890s, freeway bridges dating from the 1940s, and residential properties dating from the 1890s.</p> <p>Archaeological resources in the area of the Dumbarton crossing include prehistoric sites associated with burials and historic sites from early 1900s industrial activities. Overall, this network alternative was identified as having a moderate sensitivity for cultural resources.</p>



**Table 7.2-1**  
**Altamont Pass: San Francisco and San Jose Termini (Base Case for Altamont Pass)**

<p><b>Hydrology and Water Resources:</b><sup>iv</sup>  Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.</p>	<p>Floodplains: 308.3 ac (124.76 ha) direct and 969.4 ac (392.30 ha) indirect.  Streams: 16,824 linear ft (5,127.9 linear m) direct and 71,320 linear ft (21,738.30 linear m) indirect.  Lakes/Waterbodies: 39.6 ac (16.03 ha) direct and 154.9 ac (62.68 ha) indirect.</p> <p>Of the Altamont Pass network alternatives, this network alternative along with four other network alternatives was identified as having the highest area of impact on lakes and the San Francisco Bay due to the Dumbarton crossing. This network alternative was also identified as having the potential to impact the most groundwater resources.</p> <p>Potentially affect San Francisco Bay, Guadalupe River, San Joaquin River, Stanislaus River, Tuolumne River, Merced River, and Chowchilla River, as well as the Hetch Hetchy Aqueduct, South Bay Aqueduct, and California Aqueduct, among other water resources. Includes tunnels that would avoid impacts on the floodplain and aboveground water resources and aerial structures that would minimize impacts on floodplains, streams, creeks, and channels.</p>
<p><b>Biological Resources Including Wetlands</b> Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas</p>	<p>Wetlands<sup>v</sup>: 45.9 ac (18.59 ha) direct and 2,526 ac (1,022.2 ha) indirect.  Nonwetland Waters: 16,773 linear ft (5,122.4 linear m).  Species: 56 special-status plant and 50 special-status wildlife species.</p> <p>Of the Altamont Pass network alternatives, this network alternative along with two other network alternatives would have the potential to impact the most special-status wildlife species. This alternative could potentially result in impacts on biological resources in San Francisco Bay as a result of the Dumbarton crossing. Potentially significant impacts on special-status plant and wildlife species, wetlands, and waters.</p> <p>This network alternative would be along existing transportation corridors, with some portions in new rail corridors. Potentially result in a barrier to the movement of wildlife in areas where it severs wildlife movement corridors. Conflict with conservation and restoration plans and special management, such as the Don Edwards San Francisco Bay National Wildlife Refuge. The placement of the alignment and stations and use of tunnels and aerial structures would minimize impacts on biological resources.</p>
<p><b>Fault Crossings</b></p>	<p>San Bruno (Potentially Active) – At Grade  Hayward (Active) – At Grade  Silver Creek (Potentially Active) – Above Grade  Calaveras (Active) – Tunnel  Livermore (Potentially Active) – Above Grade  Greenville (Active) – Above Grade  Vernalis (Active) – At Grade  Buried Trace of Unnamed Fault (Potentially Active) - At Grade  Silver Creek (Potentially Active) - At Grade  Hayward (Active) - Above Grade  Mission (Potentially Active) - At Grade</p>

**Table 7.2-1**  
**Altamont Pass: San Francisco and San Jose Termini (Base Case for Altamont Pass)**

<b>Section 4(f) and 6(f) Resources:</b> <sup>4</sup> Number of resources rated high potential direct effects	There are 32 public parks, recreation lands, wildlife and waterfowl refuges that are 0-150 ft (46 m) from center of the network alternative. Few potential direct impacts are anticipated because much of the network alternative is within or directly adjacent to existing transportation rights-of-way, and few resources exist in areas where the network alternative is not adjacent to or within this existing right-of-way. Exceptions include the Augustin-Bernal Park.
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- <sup>i</sup> Generally, vibration is not a significant impact. However, sensitive and specific areas, such as historical structures and special habitats, could be affected.
- <sup>ii</sup> The farmland resources study area is defined as 25 ft (7.6 m) on each side of the alignment. When the alignment is adjacent to an existing rail corridor, the study area extends 50 ft (15 m) from the rail right-of-way on the side the alignment would run. The study area for impacts of stations is the station area footprint.
- <sup>iii</sup> The cultural resources and paleontological resources study area is defined as the area within 500 ft (152 m) on each side of the alignment centerline for new routes, 100 ft (30 m) from centerline along existing transportation facilities, and 500 ft (152 m) around station locations.
- <sup>iv</sup> The hydrology and water resources study area is defined as 25 ft (7.6 m) on each side of the alignment for two tracks and as 50 ft (15 m) on each side of centerline for four tracks. The study area for indirect impacts is 50 ft (15 m) on each side of the alignment for two tracks and as 100 ft (30 m) on each side of centerline for four tracks. The study area for direct impacts of stations is the station area footprint, and the study area for indirect impact for stations is 50 ft (15 m) from the outside edge of the station footprint area.
- <sup>v</sup> The biological resources and wetlands study area for direct impacts is defined as 50 ft (15 m) on each side of the alignment in urban areas and 0.25 mi (0.41 km) in rural areas. The study area for indirect impacts is 1,000 ft (305 m) in urban areas and 0.25 mi (0.41 km) in rural areas on each side of the alignment. The study area for direct impacts of stations is the station area, and the study area for indirect impacts for stations is 1,000 ft (305 m) in urban areas and 0.25 mi (0.41 km) in rural areas from the outside edge of the station footprint area.

<sup>4</sup> The 4(f) and 6(f) resources study area is defined as 900 ft (274 m) on each side of the alignment centerline.

## B. OAKLAND AND SAN JOSE TERMINI

This network alternative is shown in Figure 7.2-2 and described in Table 7.2-2. The segments used for this representative alternative are Niles/I-880 (West Oakland to Niles Junction), Niles/I-880 (Niles Junction to San Jose via I-880)<sup>5</sup>, East Bay Connections (Dumbarton/Niles XN and Dumbarton/Niles XS), UPRR (Niles to Altamont), Tracy Downtown (UPRR Connection), and UPRR (Central Valley).

**Table 7.2-2**  
**Altamont Pass: Oakland and San Jose Termini**

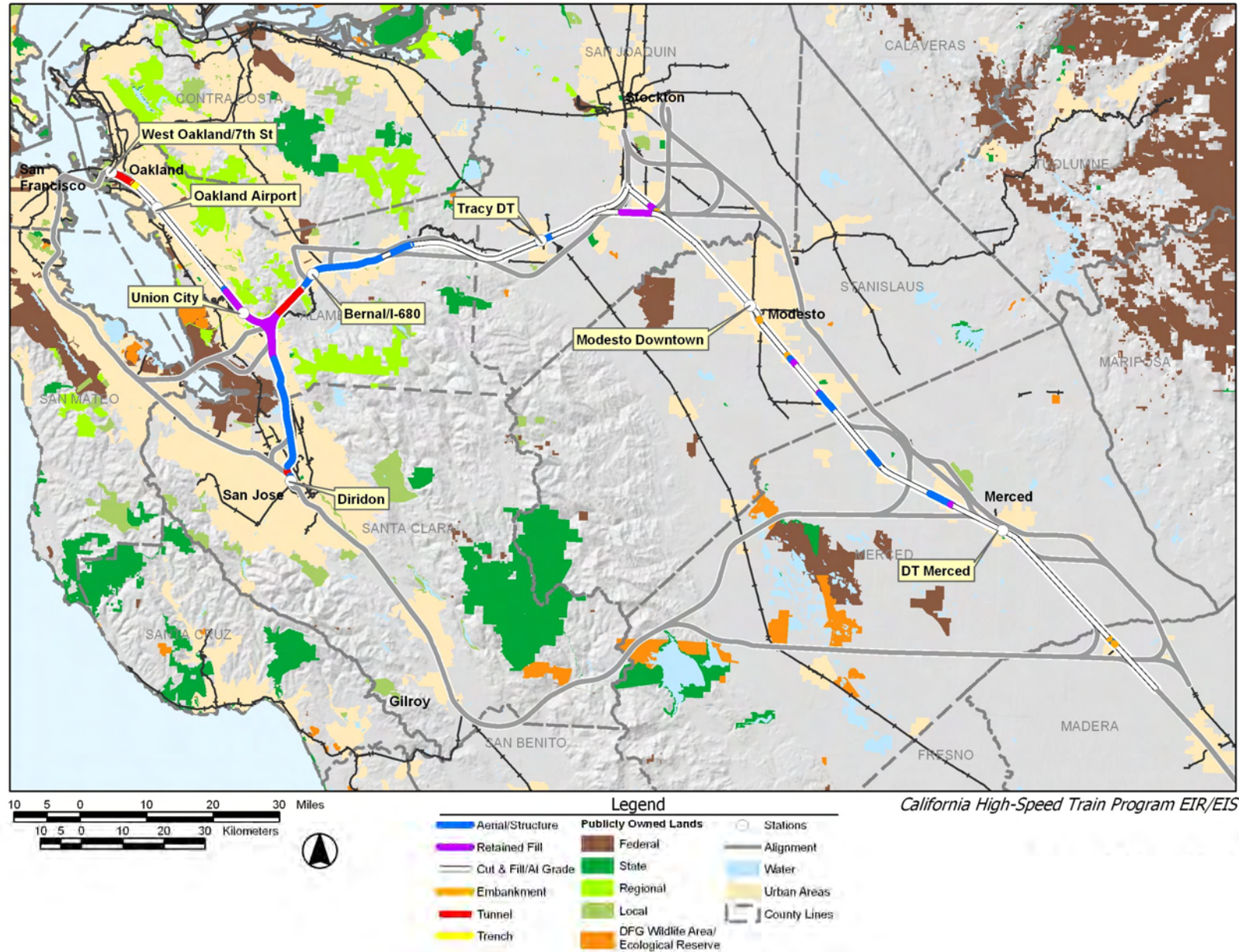
<b>Physical/Operational Characteristics</b>	
<b>Network Alternative Description</b>	From Oakland to San Jose, this network alternative would use the Niles/I-880 Alignment. The Altamont Pass would use the UPRR Alignment through downtown Tracy, and the Central Valley would use the UPRR N/S Alignment. Station location options considered for this alternative are West Oakland/7 <sup>th</sup> Street, Coliseum/Airport, Union City (BART), San Jose (Diridon), Pleasanton (I-680/Bernal Road), Tracy (Downtown), Modesto (Downtown), and Merced (Downtown).
<b>Length</b>	182.16 mi (293.17 km)
<b>Cost (dollars)</b>	\$10.0 billion
<b>Express Travel Times (minutes)</b>	Oakland–LA=2:23; Oakland–Sac=0:53; Oakland–Fresno=1:04; SJ–LA=2:19; SJ–Sac=0:49; SJ–Fresno=1:01; Livermore–LA=2:06; LA–Tracy=1:59; Oakland–Tracy=0:29; SJ–Tracy=0:25.
<b>Ridership</b>	This network alternative would directly serve downtown San Jose and Oakland, with a station serving the Oakland International Airport (Coliseum/BART), the I-580 and I-880 corridors, and the Central Valley and would have high ridership and revenue potential. Total ridership and revenue for the statewide HST system with this network alternative is forecast to be 88 million passengers and \$2.88 billion per year by 2030. Ridership for this network alternative would be about the same as the Altamont “Base Case” network alternative.
<b>Constructability</b>	Portions of this network alternative are aligned in or along existing passenger rail lines and highways. Maintaining operations on the existing passenger rail service and automobile traffic while constructing grade separations, tunnels, elevated sections, and stations would involve major construction issues/challenges. However, the HST infrastructure could be constructed incrementally to minimize impact to existing operations.
<b>O &amp; M Cost (dollars per year)</b>	\$1,085 million
<b>Operational Issues</b>	Average Speed SF–LA=168.8 mph (281.2kph); SF–Sac=129.5 mph (215.8 kph); SF–Fresno=148.0 mph (246.7 kph); SJ–LA=178.7 mph (297.9 kph); SJ–Sac=144.1 mph (240.2 kph); SJ–Fresno=165 mph (275 kph); Livermore–LA=182.9 mph (304.8 kph); Tracy–LA=183.4 mph (305.7 kph); SF–Tracy=107.1 mph (178.5 kph); SJ–Tracy=120.7 (201.2 kph). Maximum Speed SF–LA=210 mph (350 kph); SF–Sac=198 mph (330 kph); SF–Fresno=210 mph (350 kph);

<sup>5</sup> Does not include Niles Junction to Niles Wye S (“Niles/I-880 5A”) segment.

**Table 7.2-2  
Altamont Pass: Oakland and San Jose Termini**

	<p>SJ–LA=210 mph (350 kph); SJ–Sac=198 mph (330 kph); SJ–Fresno=210 mph (350 kph); Livermore–LA=210 mph (350 kph); Tracy–LA=210 mph (350 kph); SF–Tracy=169.2 mph (282 kph); SJ–Tracy=180 mph (300 kph).</p> <p>This network alternative would require the system to split in two separate directions to serve both San Jose and Oakland, given a constant number of trains. This decreases the frequency of service from southern California to these stations by a factor of two, as compared to network alternatives using the Pacheco Pass alignment alternatives. Based on forecasted travel demand, two-thirds of the trains would be directed to Oakland and one-third of the trains would be directed to San Jose. HST operations would need to be coordinated and integrated with ACE service in the I-580 corridor.</p>
<b>Potential Environmental Impacts</b>	
<b>Travel Conditions</b>	<p>The Niles/I-880 corridor alignment alternatives would bring direct HST service up the East Bay to Oakland with potential stations in West Oakland at Oakland International Airport (Coliseum/BART), in the East and South Bay with stations in Union City (BART) and San Jose (Diridon), in the Tri-Valley with a station in Pleasanton (I-680/Bernal Road), in downtown Tracy, and in the Central Valley with stations in Modesto and Merced. This network alternative would increase connectivity and accessibility to Oakland, the Oakland International Airport (Coliseum/BART), southern Alameda County, San Jose, the I-580 Corridor and Tri-Valley area, and the Central Valley. This network alternative would provide a safer, more reliable, energy efficient intercity mode along the East Bay while improving the safety, reliability, and performance of the regional commuter service. This network alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic. The fully grade-separated Niles/I-880 alignment alternative between Oakland and Union City would improve local traffic flow and reduce air pollution at existing rail crossings. There would also be some grade separation benefits in the UPRR in the I-580 corridor and UPRR N/S alignment alternative through the Central Valley. This network alternative would not provide direct HST service to San Francisco, SFO, the San Francisco Peninsula/Caltrain Corridor, and South Santa Clara County.</p>
<b>Noise and Vibration:</b> <sup>i</sup> High, medium, or low potential impacts	<p>Medium potential of noise impacts for the overall alternative. Medium potential of vibration impacts for the overall alternative. High potential of vibration impacts from Oakland to Niles Junction. Medium potential of vibration impacts, from Niles Junction/San Jose to downtown Tracy and a low potential in the Central Valley.</p>
<b>Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice</b>	<p><b>Compatibility:</b> Majority of network alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. It exhibits low compatibility where it does not follow a transportation right-of-way in the Altamont Pass area. It exhibits a medium compatibility in the Lathrop, Manteca, Modesto and Merced areas.</p> <p><b>Environmental Justice:</b> This network alternative has medium environmental justice impact rating for the East Bay between Oakland and San Jose and low environmental justice impact rating for the UPRR alignment from Niles Canyon to the Central Valley. Environmental justice impact is rated as medium in the Central Valley except in the Manteca area, where the impact rating is low.</p> <p><b>Community:</b> This network alternative would not affect community cohesion, given that the majority of the alignment is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p><b>Property:</b> This network alternative has the potential for high property impacts in the Niles Canyon and Manteca areas, where additional right-of-way would be required.</p>





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**Figure 7.2-2**  
**Network Alternatives**  
**Altamont Pass**  
**Oakland and San Jose Termini**



**Table 7.2-2**  
**Altamont Pass: Oakland and San Jose Termini**

<b>Aesthetics and Visual Resources:</b> General impacts and rating.	Segments visual ratings: (1) Oakland to Niles Junction =low; (2) Niles Junction to San Jose =medium; (3) UPRR =medium; (4) Tracy Downtown =low; and (5) UPRR N/S =low. Overall network alternative rating is low to medium.
<b>Farmlands:</b> <sup>ii</sup> Ac (ha) potentially affected	Farmland: 761.9 ac (308.33 ha).  Impact up to 426.8 ac (172.71 ha) of prime farmland. The majority of potential farmland impacts would occur along the Tracy and the UPRR (North/South) segments. Overall, this network alternative would have moderate impacts to farmland within the Altamont Pass network alternatives.
<b>Cultural Resources and Paleontological Resources:</b> <sup>iii</sup> Potential presence of historical resources in area of potential effect	There are 128 known cultural resources.  Historic properties and buildings dating from the 1900s are within the area of potential effects along with water delivery systems and canals dating from the 1890s, freeway bridges dating from the 1940s, and residential properties dating from the 1880s. Overall, this network alternative was identified as having a high sensitivity for cultural resources.
<b>Hydrology and Water Resources:</b> <sup>iv</sup> Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	Floodplains: 218.6 ac (88.48 ha) direct/ 720.4 ac (291.56 ha) indirect Streams: 17,660 linear ft (5,382.7 linear m) direct/ 76,905 linear ft (23,440.49 linear m) indirect Lakes/Waterbodies: 2.3 ac (0.93 ha) direct/ 7.6 ac (3.08 ha) indirect  Of the Altamont Pass network alternatives, this network alternative along with four other network alternatives was identified to have the least area of impact on lakes and would not result in impacts on San Francisco Bay.  Potentially affect Guadalupe River, San Joaquin River, Stanislaus River, Tuolumne River, Merced River, and Chowchilla River as well as the Hetch Hetchy Aqueduct, South Bay Aqueduct, and California Aqueduct among other water resources. Includes tunnels that would avoid impacts on the floodplain and above ground water resources, and aerial structures that would minimize impact on floodplains and streams, creeks, and channels.
<b>Biological Resources Including Wetlands</b> Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	Wetlands <sup>v</sup> : 12.3 ac (4.97 ha) direct/ 805 ac (325.7 ha) indirect Non-Wetland Waters: 14,032 linear ft (4,277.0 linear m) Species: 40 special-status plant and 44 special-status wildlife species  Potentially significant impacts to special-status plant and wildlife species, wetlands, and waters.  Network alternative would be along existing transportation corridors with some portions in new rail corridors. Potentially result in a barrier to the movement of wildlife in areas where it severs wildlife movement corridors. Conflict with conservation and restoration plans and special management areas. The placement of the alignment and stations and use of tunnels and aerial structures would minimize impacts on biological resources.

**Table 7.2-2**  
**Altamont Pass: Oakland and San Jose Termini**

<b>Fault Crossings</b>	Hayward (Active) – At Grade - Adjacent and Parallel Hayward (Active) – At Grade Silver Creek (Potentially Active) – Above Grade Calaveras (Active) – Tunnel Livermore (Potentially Active) – Above Grade Greenville (Active) – Above Grade Vernalis (Active) – At Grade
<b>Section 4(f) and 6(f) Resources:</b> <sup>4</sup> Number of resources rated high potential direct effects	There are 29 public parks, recreation lands, wildlife and waterfowl refuges that are 0–150 ft (46 m) from center of the network alternative. Few potential direct impacts are anticipated given that much of the network alternatives is within or directly adjacent to existing transportation rights-of-way, and few resources exist in areas where the network alternative is not adjacent to or within this existing right-of-way. Exceptions include the Augustin-Bernal Park.

## C. SAN FRANCISCO, OAKLAND, AND SAN JOSE TERMINI

This network alternative is shown in Figure 7.2-3 and described in Table 7.2-3. The segments used for this representative alternative are Caltrain Corridor (SF to Dumbarton), Dumbarton (High Bridge)<sup>6</sup>, Niles/I-880 (West Oakland to Niles Junction), Niles/I-880 (Niles Junction to San Jose via I-880)<sup>7</sup>, East Bay Connections (Dumbarton/Niles XS & Dumbarton/Niles XN), UPRR (Niles to Altamont), Tracy Downtown (UPRR Connection), and UPRR (Central Valley).

**Table 7.2-3**  
**Altamont Pass: San Francisco, Oakland, and San Jose Termini**

<b>Physical/Operational Characteristics</b>	
<b>Network Alternative Description</b>	From Oakland to San Jose, this network alternative would use the Niles/I-880 Alignment. From San Francisco to Redwood City, this network alternative would use the existing Caltrain rail right-of-way. This network alternative would cross the San Francisco Bay in the Dumbarton corridor. The Altamont Pass would use the UPRR Alignment through downtown Tracy, and the Central Valley would use the UPRR N/S Alignment. Station location options considered for this alternative are Transbay Transit Center, Millbrae/SFO, Redwood City (Caltrain), West Oakland/7 <sup>th</sup> Street, Coliseum/Airport, Union City (BART), San Jose (Diridon), Pleasanton (I-680/Bernal Road), Tracy (Downtown), Modesto (Downtown), and Merced (Downtown).
<b>Length</b>	241.16 mi (388.12 km)
<b>Cost (dollars)</b>	\$15.1 billion <sup>8</sup>
<b>Express Travel Times (minutes)</b>	SF–LA=2:36; Oakland–LA=2:23; SJ–LA=2:19; SF–Sac=1:06; Oakland–Sac=0:53; SJ–Sac=0:49; SF–Fresno=1:18; Oakland–Fresno=1:04; SJ–Fresno=1:01; Livermore–LA=2:06; Tracy–LA=1:59; SF–Tracy=0:42; Oakland–Tracy=0:29; SJ–Tracy=0:25
<b>Ridership</b>	This network alternative would directly serve downtown San Francisco and San Francisco International Airport (SFO), Oakland and the Oakland International Airport (Coliseum/BART), San Jose and the I-580 and I-880 corridors, and the Central Valley. The ridership and revenue is less for this network alternative than other Altamont network alternatives because of the reduced frequency of service to major markets (some trains serving Oakland, some San Francisco, and some San Jose). Total ridership and revenue for the statewide HST system with this network alternative is forecast to be 81.1 million passengers and \$2.63 billion per year by 2030. Additional frequency of service to San Francisco, San Jose, and Oakland (along with higher operational costs) would be needed to increase ridership for this network alternative. Ridership for this network alternative is forecast to be about 7.7% less than the Altamont “Base Case” network alternative.

<sup>6</sup> Does not include “Dumbarton Wye South to Caltrain” segment.

<sup>7</sup> Does not include Niles Junction to Niles Wye S (“Niles/I-880 5A”) segment.

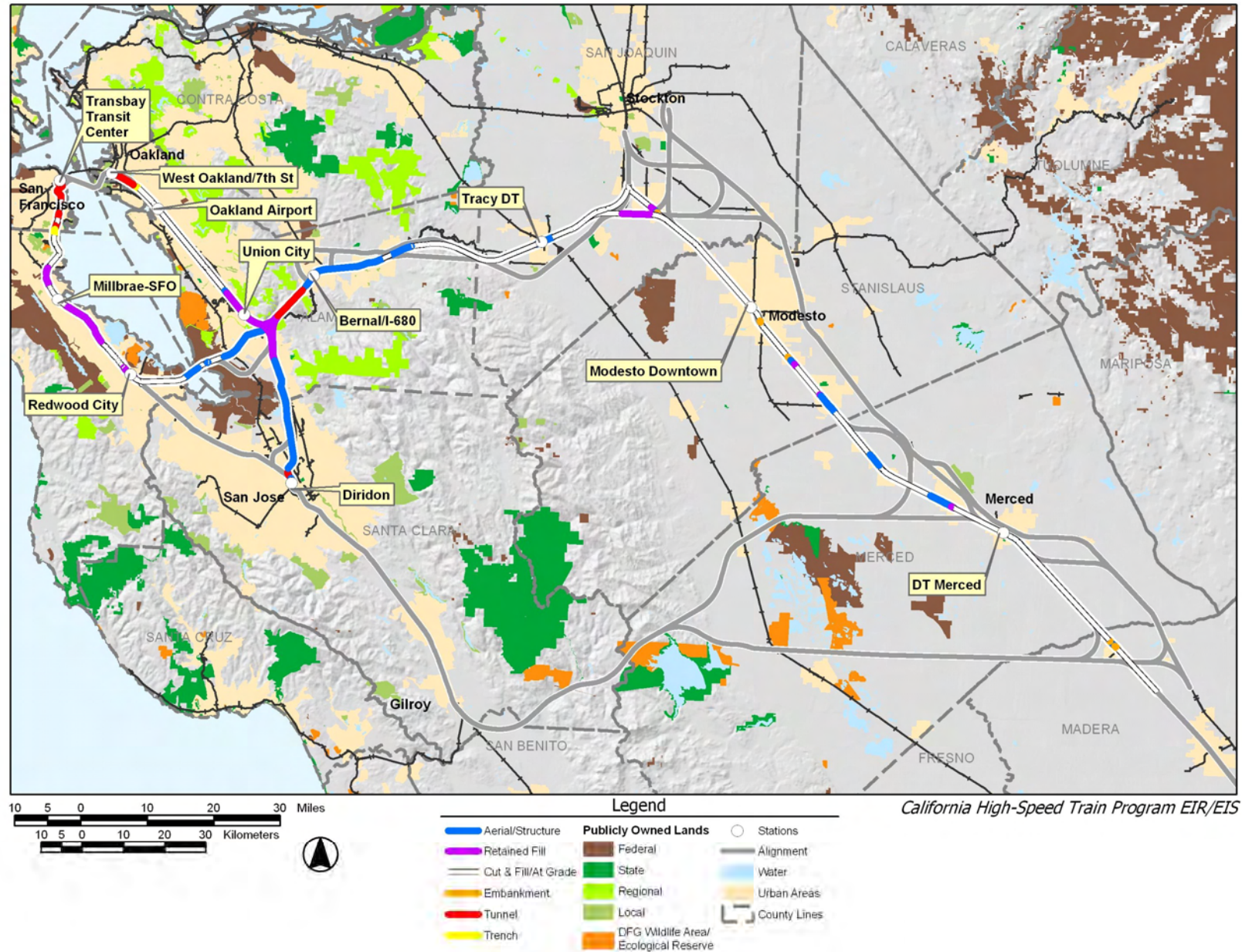
<sup>8</sup> Includes terminal at 4<sup>th</sup> and King. Does not include segment cost from 4<sup>th</sup> Street to Transbay Transit Center or station cost for the Transbay Transit Center.



**Table 7.2-3**  
**Altamont Pass: San Francisco, Oakland, and San Jose Termini**

<b>Constructability</b>	Constructing a new bridge crossing along the Dumbarton corridor would involve major construction activities in sensitive wetlands, saltwater marshes, and aquatic habitat. Special construction methods and mitigations would be required. Portions of this network alternative are aligned in or along existing passenger rail lines. Maintaining operations on the existing passenger rail and automobile traffic service while constructing grade separations, tunnels, elevated sections, and stations would involve major construction issues/challenges. However, the HST infrastructure could be constructed incrementally to minimize impact to existing operations.
<b>O &amp; M Cost (dollars per year)</b>	\$1,098 million
<b>Operational Issues</b>	<p>Average Speed</p> <p>SF–LA=168.8 mph (281.2 kph); Oakland–LA=176.3 mph (293.8 kph); SJ–LA=178.7 mph (297.9 kph); SF–Sac=129.5 mph (215.8 kph); Oakland–Sac=140.1 mph (233.5 kph); SJ–Sac=144.1 mph (240.2 kph); SF–Fresno=148 mph (246.7 kph); Oakland–Fresno=162.9_ mph (271.6 kph); SJ–Fresno=165 mph (275 kph); Livermore–LA=182.9 mph (304.8 kph); Tracy–LA=183.4 mph (305.7 kph); SF–Tracy=107.1 mph (178.5 kph); Oakland–Tracy=116.6 mph (194.3 kph); SJ–Tracy=120.7 mph (201.2 kph)</p> <p>Maximum Speed</p> <p>SF–LA=210 mph (350 kph); Oakland–LA=210 mph (350 kph); SJ–LA=210 mph (350 kph); SF–Sac=198 mph (330 kph); Oakland–Sac=198 mph (330 kph); SJ–Sac=198 mph (330 kph); SF–Fresno=210 mph (350 kph); Oakland–Fresno=210 mph (350 kph); SJ–Fresno=210 mph (350 kph); Livermore–LA=210 mph (350 kph); Tracy–LA=210 mph (350 kph); SF–Tracy=169.2 mph (282 kph); Oakland–Tracy=178.2 mph (297 kph); SJ–Tracy=180 mph (300 kph)</p> <p>HST operations would need to be coordinated and integrated with Caltrain service on the SF Peninsula and ACE service in the I-580 corridor. Using the Altamont Pass would require the system to split in three different directions at Newark/Fremont to simultaneously serve San Jose, San Francisco, and Oakland in addition to the line split in the Central Valley to serve both Sacramento and the Bay Area. This would mean that some trains from Los Angeles or Sacramento would go to San Francisco and some to Oakland, while others would go to San Jose.<sup>9</sup> The variety of service types (express, semi-express, suburban express, regional, and local) and the comparatively short distances (relative to international high-speed train services in operation) between the three potential Bay Area terminus stations contribute to the significant inefficiency of serving all three of these stations. Based on forecasted travel demand, one-third of the trains were directed to each terminus, which is equivalent to two-thirds of the trains serving San Francisco and Oakland, with one-third of the trains serving San Jose.</p>

<sup>9</sup> Separate trains are required because the trainsets cannot be easily split to send some vehicles to each destination. Although some passenger train services operate in this manner, the time required to physically separate a trainset into smaller units and prepare them for individual operation (e.g., ensuring separation of passengers, separating vehicles, initiating additional onboard personnel, switching power supply connections, completing system initiation checks after power switch, providing appropriate power vehicles) would be prohibitive, and the process would be highly undesirable for the passengers involved. In addition, the trainsets would be sealed for aerodynamic and passenger comfort purposes, further constraining the ability to physically split the trainsets, unless the trainsets were preconfigured in specific subsets prior to the start of service. Thus, it is assumed that the high-speed trainsets would not be physically separated during the operational period.



California High-Speed Train Program EIR/EIS



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Federal Railroad Administration

**Figure 7.2-3**  
**Network Alternatives**  
**Altamont Pass**  
**San Francisco, Oakland, and San Jose Termini**





**Table 7.2-3**  
**Altamont Pass: San Francisco, Oakland, and San Jose Termini**

<b>Potential Environmental Impacts</b>	
<b>Travel Conditions</b>	The Caltrain corridor Alignment would bring direct HST service up the San Francisco Peninsula from Redwood City to downtown San Francisco with potential stations in downtown San Francisco, at SFO (Millbrae), a mid-Peninsula station at Redwood City, to the East and South Bay with stations in Oakland, Oakland Airport (Coliseum/BART), Union City (BART) and San Jose (Diridon), to the Tri-Valley with a station in Pleasanton (I-680/Bernal Road), a downtown station in Tracy, and Central Valley stations in Modesto and Merced. This network alternative would increase connectivity and accessibility to San Francisco, the northern Peninsula and SFO, the hub international airport for northern California, Oakland, the Oakland International Airport (Coliseum/BART), southern Alameda County, San Jose, the I-580 Corridor and Tri-Valley area, and the Central Valley. This network alternative would provide a safer, more reliable, energy-efficient intercity mode along the northern portion of the San Francisco Peninsula while improving the safety, reliability, and performance of the regional commuter service. The HST Network Alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic. The fully grade-separated Caltrain corridor north of Redwood City, Niles/I-880 Alignment between Oakland and Union City, would improve local traffic flow and reduce air pollution at existing rail crossings. There would also be some grade separation benefits in the UPRR in the I-580 corridor and UPRR N/S Alignment through the Central Valley. This network alternative would not provide direct HST service to south Santa Clara County.
<b>Noise and Vibration:</b> <sup>i</sup> High, medium, or low potential impacts	Medium potential of noise impacts for the overall alternative, with a high potential of noise impacts in the Dumbarton Corridor. Medium potential of vibration impacts for the overall alternative. High potential of vibration impacts from Oakland to Niles Junction. Medium potential of vibration impacts, from San Francisco/Niles Junction/San Jose to downtown Tracy and a low potential in the Central Valley.
<b>Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice</b>	<p><b>Compatibility:</b> Majority of network alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. It exhibits low compatibility where it does not follow a transportation right-of-way in the Altamont Pass area. It exhibits a medium to high compatibility where it crosses the San Francisco Bay, in Fremont along the more narrow Centerville line, in the Shinn area. It has a medium compatibility in the Lathrop, Manteca, Modesto and Merced areas.</p> <p><b>Environmental Justice:</b> This network alternative has medium environmental justice impact rating for the Caltrain Corridor (north of Redwood City) and the east bay alignment from Oakland to San Jose. It has a low environmental justice impact rating for the UPRR alignment from Niles Canyon to the Central Valley. Environmental justice impact is rated as medium in the Central Valley except in the Manteca area, where the impact rating is low.</p> <p><b>Community:</b> This network alternative would not affect community cohesion, given that the majority of the alignment is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p><b>Property:</b> This network alternative has the potential for high property impacts in the Niles Canyon, Shinn, and Manteca areas, where additional right-of-way would be required.</p>
<b>Aesthetics and Visual Resources:</b> General impacts and rating.	Segments visual ratings: (1) Caltrain – San Francisco to Dumbarton =low; (2) Oakland to Niles Junction =low; (3) Niles Junction to San Jose =medium; (4) UPRR =medium; (5) Tracy Downtown =low; (6) Dumbarton High Bridge =medium; and (7) UPRR N/S =low. Overall network alternative rating is low to medium.

**Table 7.2-3**  
**Altamont Pass: San Francisco, Oakland, and San Jose Termini**

<b>Farmlands:</b> <sup>ii</sup> Ac (ha) potentially affected	<p>Farmland: 764.2 ac (309.28 ha)</p> <p>Impact up to 429.1 ac (173.65 ha) of prime farmland. The majority of potential farmland impacts would occur along the Tracy and the UPRR (North/South) segments. Overall, this network alternative along with the San Francisco and San Jose Termini would have the greatest potential impact on farmland within the Altamont Pass network alternatives.</p>
<b>Cultural Resources and Paleontological Resources:</b> <sup>iii</sup> Potential presence of historical resources in area of potential effect	<p>There are 175 known cultural resources.</p> <p>This network alternative extends through numerous historic districts in San Francisco. Historic properties and buildings dating from the 1900s are within the area of potential effects along with water delivery systems and canals dating from the 1890s, freeway bridges dating from the 1940s, and residential properties dating from the 1890s. Archaeological resources in the area of the Dumbarton crossing include prehistoric sites associated with burials, and historic sites from early 1900s industrial activities. Overall, this network alternative was identified as having a high sensitivity for cultural resources.</p>
<b>Hydrology and Water Resources:</b> <sup>iv</sup> Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	<p>Floodplains: 315.3 ac (127.62 ha) direct/ 983.7 ac (398.12 ha) indirect</p> <p>Streams: 19,814 linear ft (6,039.3 linear m) direct/ 82,951 linear ft (25,283.31 linear m) indirect</p> <p>Lakes/Waterbodies: 39.6 ac (16.03 ha) direct/ 154.9 ac (62.68 ha) indirect</p> <p>Of the Altamont Pass network alternatives, this network alternative along with four other network alternatives was identified to have the highest area of impact on lakes and the San Francisco Bay due to the Dumbarton crossing. This network alternative was also identified as having the potential to encounter the most erosive soils.</p> <p>Potentially affect the San Francisco Bay, Guadalupe River, San Joaquin River, Stanislaus River, Tuolumne River, Merced River, and Chowchilla River as well as the Hetch Hetchy Aqueduct, South Bay Aqueduct, and California Aqueduct among other water resources. Includes tunnels that would avoid impacts on the floodplain and above ground water resources, and aerial structures that would minimize impact on floodplains and streams, creeks, and channels.</p>
<b>Biological Resources Including Wetlands</b> Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	<p>Wetlands<sup>v</sup>: 46.3 ac (18.73 ha) direct/ 2,594 ac (1,049.7 ha) indirect</p> <p>Non-Wetland Waters: 16,932 linear ft (5,160.9 linear m)</p> <p>Species: 57 special-status plant and 50 special-status wildlife species</p> <p>Of the Altamont Pass network alternatives, this network alternative would have the potential to impact the most special-status plant species, wetlands, and waters. Along with two other network alternatives would have the potential to impact the most special-status wildlife species. This alternative could potentially result in impacts on biological resources in San Francisco Bay as a result of the Dumbarton crossing. Potentially significant impacts on special-status plant and wildlife species, wetlands, and waters.</p> <p>Network alternative would be along existing transportation corridors with some portions in new rail corridors. Potentially result in a barrier to the movement of wildlife in areas where it severs wildlife movement corridors. Conflict with conservation and restoration plans and special management areas, such as the Don Edwards San Francisco Bay National Wildlife Refuge. The placement of the alignment and stations and use of tunnels and aerial structures would minimize impacts on biological resources.</p>

**Table 7.2-3**  
**Altamont Pass: San Francisco, Oakland, and San Jose Termini**

<b>Fault Crossings</b>	San Bruno (Potentially Active) – At Grade Hayward (Active) – At Grade - Adjacent and Parallel Hayward (Active) – At Grade Silver Creek (Potentially Active) – Above Grade Calaveras (Active) – At Grade Calaveras (Active) – Tunnel Livermore (Potentially Active) – Above Grade Greenville (Active) – Above Grade Vernalis (Active) – At Grade Buried Trace of Unnamed Fault (Potentially Active) - At Grade Silver Creek (Potentially Active) - At Grade Hayward (Active) - Above Grade Mission (Potentially Active) - At Grade
<b>Section 4(f) and 6(f) Resources:</b> <sup>4</sup> Number of resources rated high potential direct effects	There are 39 public parks, recreation lands, wildlife and waterfowl refuges that are 0–150 ft (46 m) from center of the network alternative. Few potential direct impacts are anticipated given that much of the network alternatives is within or directly adjacent to existing transportation rights-of-way, and few resources exist in areas where the network alternative is not adjacent to or within this existing right-of-way. Exceptions include the Augustin-Bernal Park.

## D. SAN JOSE TERMINUS

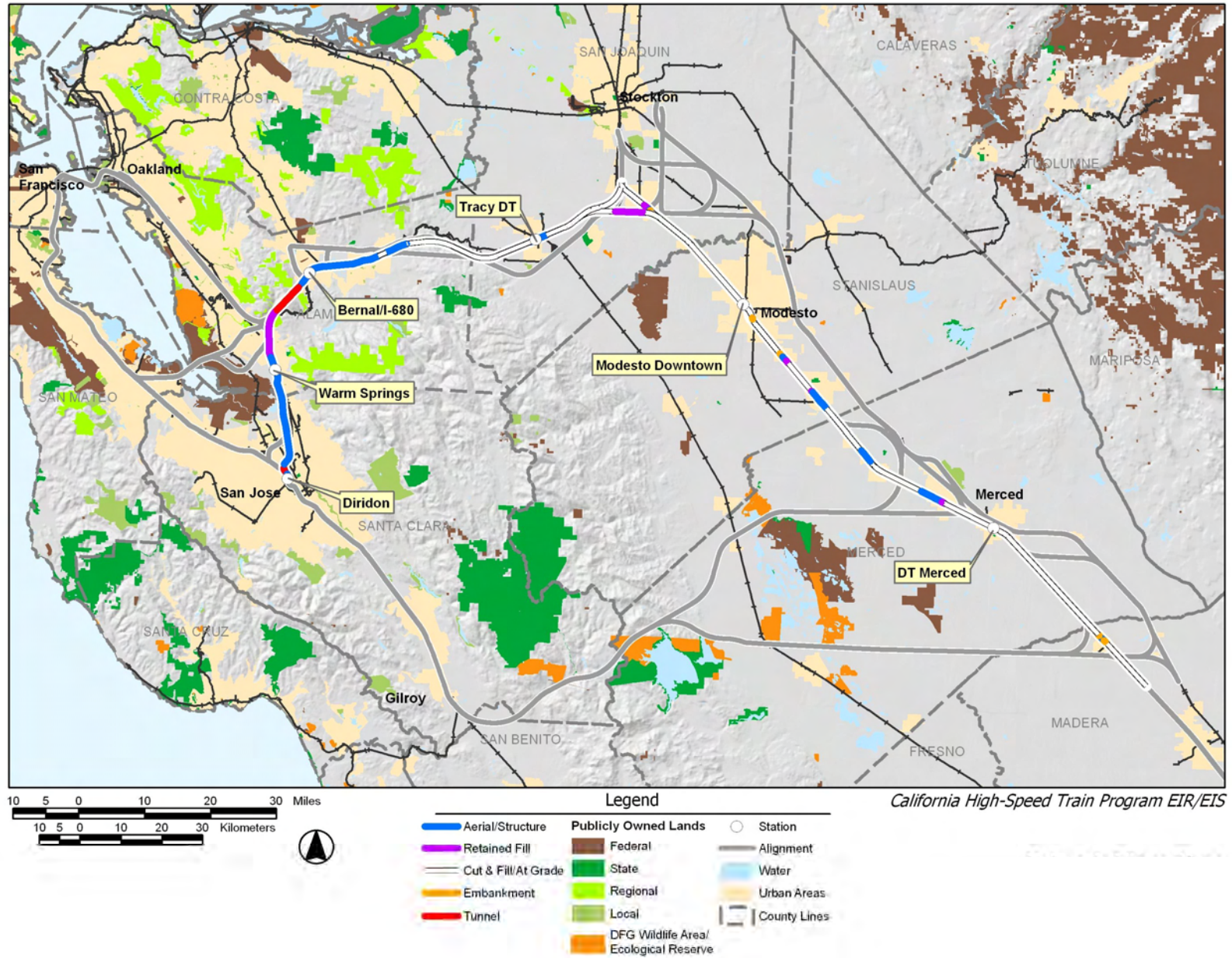
This network alternative is shown in Figure 7.2-4 and described in Table 7.2-4. The segments used for this representative alternative are Niles/I-880 (Niles Junction to San Jose via I-880)<sup>10</sup>, East Bay Connection (Dumbarton/Niles XS), UPRR (Niles to Altamont), Tracy Downtown (UPRR Connection), and UPRR (Central Valley).

**Table 7.2-4**  
**Altamont Pass: San Jose Terminus**

<b>Physical/Operational Characteristics</b>	
<b>Network Alternative Description</b>	From San Jose, this network alternative would use the Niles/I-880 Alignment between San Jose and Niles. The Altamont Pass would use the UPRR Alignment through downtown Tracy, and the Central Valley would use the UPRR N/S Alignment. Station location options considered for this alternative are San Jose (Diridon), Fremont (Warm Springs), Pleasanton (I-680/Bernal Road), Tracy (Downtown), Modesto (Downtown), and Merced (Downtown).
<b>Length</b>	160.18 mi (257.78 km)
<b>Cost (dollars)</b>	\$7.7 billion
<b>Express Travel Times (minutes)</b>	SJ-LA=2:19; SJ-Sac=0:49; SJ Fresno=1:01; Livermore-LA=2:06; Tracy-LA=1:59; SJ-Tracy=0:25
<b>Ridership</b>	This network alternative would directly serve downtown San Jose, the I-880 and I-580 corridors, and the Central Valley. Although this network alternative does not directly serve Oakland or San Francisco, it provides high ridership and revenue because of the high frequency of service provided to San Jose. Total ridership and revenue for the statewide HST system with this network alternative is forecast to be 94.6 million passengers and \$3.18 billion per year by 2030. Ridership for this network alternative is forecast to be about the 7.7% higher than the Altamont "Base Case" network alternative and with revenue about 11.7% higher.
<b>Constructability</b>	Portions of this network alternative are aligned in or along existing passenger rail lines. Maintaining operations on the existing passenger rail service while constructing grade separations, tunnels, elevated sections, and stations would involve major construction issues/challenges. However, the HST infrastructure could be constructed incrementally to minimize impact to existing operations.
<b>O &amp; M Cost (dollars per year)</b>	\$1,076 million
<b>Operational Issues</b>	<p>Average Speed</p> <p>SJ-LA=178.7 mph (297.9 kph); SJ-Sac=144.1 mph (240.2 kph); SJ-Fresno=165 mph (275 kph); Livermore-LA=182.9 mph (304.8 kph); Tracy-LA=183.4 mph (305.7 kph); SJ-Tracy=120.7 mph (201.2 kph)</p> <p>Maximum Speed</p> <p>SJ-LA=210 mph (350 kph); SJ-Sac=198 mph (330 kph); SJ-Fresno=210 mph (350 kph); Livermore-LA=210 mph (350 kph); Tracy-LA=210 mph (350 kph); SJ-Tracy=180 mph (300 kph)</p> <p>HST operations would need to be coordinated and integrated with all transportation services at San Jose. HST</p>

<sup>10</sup> Does not include Niles Junction to Niles Wye S ("Niles/I-880 5a") segment.





**Figure 7.2-4**  
**Network Alternatives**  
**Altamont Pass**  
**San Jose Terminus**



**Table 7.2-4**  
**Altamont Pass: San Jose Terminus**

	operations would need to be coordinated and integrated with ACE service in the I-580 corridor.
<b>Potential Environmental Impacts</b>	
<b>Travel Conditions</b>	This network alternative would increase connectivity and accessibility to southern Alameda County, San Jose, the I-580 Corridor and Tri-Valley area, and the Central Valley. The HST Network Alternative would provide a safer, more reliable, energy-efficient intercity mode along a portion of the I-880 corridor and the I-580 corridor, with stations in San Jose (Diridon) Freeport (Warm Springs), Pleasanton (I-680/Bernal Road), downtown Tracy, and Central Valley stations in Modesto and Merced. The HST Network Alternative would greatly increase the capacity for intercity and commuter travel to San Jose and reduce existing automobile traffic. The fully grade-separated UPRR in the I-580 corridor and UPRR N/S Alignment through the Central Valley would improve local traffic flow and reduce air pollution at some existing rail crossings. This network alternative would not provide direct HST service to San Francisco, SFO, the SF Peninsula/Caltrain Corridor, Oakland, Oakland Airport, and south Santa Clara County resulting in considerably less Travel Conditions benefits (travel times, reliability, safety, connectivity, sustainable capacity, and passenger cost) than other network alternatives that directly serve additional stations/markets in the Bay Area.
<b>Noise and Vibration:</b> <sup>i</sup> High, medium, or low potential impacts	Medium potential of noise impacts for the overall alternative. Medium potential of vibration impacts for the overall alternative. Medium potential of vibration impacts, from San Jose to downtown Tracy and a low potential in the Central Valley.
<b>Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice</b>	<p>Compatibility: Majority of network alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. It exhibits a medium compatibility in the Lathrop, Manteca, Modesto and Merced areas.</p> <p>Environmental Justice: This network alternative has medium environmental justice impact rating for the east bay from Niles Junction to San Jose and low environmental justice impact rating for the UPRR alignment from Niles Canyon to the Central Valley. Environmental justice impact is rated as medium in the Central Valley except in the Manteca area, where the impact rating is low.</p> <p>Community: This network alternative would not affect community cohesion, given that the majority of the alignment is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: This network alternative has the potential for high property impacts in the Niles Canyon and Manteca areas, where additional right-of-way would be required.</p>
<b>Aesthetics and Visual Resources:</b> General impacts and rating.	Segments visual ratings: (1) Niles Junction to San Jose =medium; (2) UPRR =medium; (3) Tracy Downtown =low; and (4) UPRR N/S =low. Overall network alternative rating is low to medium.
<b>Farmlands:</b> <sup>ii</sup> Ac (ha) potentially affected	<p>Farmland: 761.9 ac (308.33 ha)</p> <p>Impact up to 426.8 ac (172.71 ha) of prime farmland. The majority of potential farmland impacts would occur along the Tracy and the UPRR (North/South) segments. Overall, this network alternative would have moderate impacts to farmland within the Altamont Pass network alternatives.</p>

**Table 7.2-4  
Altamont Pass: San Jose Terminus**

<b>Cultural Resources and Paleontological Resources:</b> <sup>iii</sup> Potential presence of historical resources in area of potential effect	There are 93 known cultural resources.  Historic properties and buildings dating from the 1920s are within the area of potential effects along with water delivery systems and canals dating from the 1890s, freeway bridges dating from the 1940s, and residential properties dating from the 1890s. Overall, this network alternative was identified as having a low sensitivity for cultural resources.
<b>Hydrology and Water Resources:</b> <sup>iv</sup> Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	Floodplains: 211.6 ac (85.62 ha) direct/ 706.1 ac (285.74 ha) indirect Streams: 14,670 linear ft (4,471.3 linear m) direct/ 65,274 linear ft (19,895.48 linear m) indirect Lakes/Waterbodies: 2.3 ac (0.93 ha) direct/ 7.6 ac (3.08 ha) indirect  Of the Altamont Pass network alternatives, this network alternative along with four other network alternatives was identified to have the least area of impact on lakes and would not result in impacts on San Francisco Bay. This network alternative was also identified as having the potential to encounter the least amount of erosive soils.  Potentially affect Guadalupe River, San Joaquin River, Stanislaus River, Tuolumne River, Merced River, and Chowchilla River as well as the Hetch Hetchy Aqueduct, South Bay Aqueduct, and California Aqueduct among other water resources. Includes tunnels that would avoid impacts on the floodplain and above ground water resources, and aerial structures that would minimize impact on floodplains and streams, creeks, and channels.
<b>Biological Resources Including Wetlands</b> Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	Wetlands <sup>v</sup> : 12.0 ac (4.84 ha) direct/ 737 ac (298.1 ha) indirect Non-Wetland Waters : 13,577 linear ft (4,138.2 linear m) Species: 39 special-status plant and 43 special-status wildlife species Potentially significant impacts to special-status plant and wildlife species, wetlands, and waters.  Network alternative would be along existing transportation corridors with some portions in new rail corridors. Potentially result in a barrier to the movement of wildlife in areas where it severs wildlife movement corridors. Conflict with conservation and restoration plans and special management areas. The placement of the alignment and stations and use of tunnels and aerial structures would minimize impacts on biological resources.
<b>Fault Crossings</b>	Hayward (Active) – At Grade Silver Creek (Potentially Active) – Above Grade Calaveras (Active) – Tunnel Livermore (Potentially Active) – Above Grade Greenville (Active) – Above Grade Vernalis (Active) – At Grade
<b>Section 4(f) and 6(f) Resources:</b> <sup>4</sup> Number of resources rated high potential direct effects	There are 22 public parks, recreation lands, wildlife and waterfowl refuges that are 0–150 ft (46 m) from center of the network alternative. Few potential direct impacts are anticipated given that much of the network alternatives is within or directly adjacent to existing transportation rights-of-way, and few resources exist in areas where the network alternative is not adjacent to or within this existing right-of-way. Exceptions include the Augustin-Bernal Park.



## E. SAN FRANCISCO TERMINUS

This network alternative is shown in Figure 7.2-5 and described in Table 7.2-5. The segments used for this representative alternative are Caltrain Corridor (SF to Dumbarton), Dumbarton (High Bridge)<sup>11</sup>, UPRR (Niles to Altamont), Tracy Downtown (UPRR Connection), and UPRR (Central Valley).

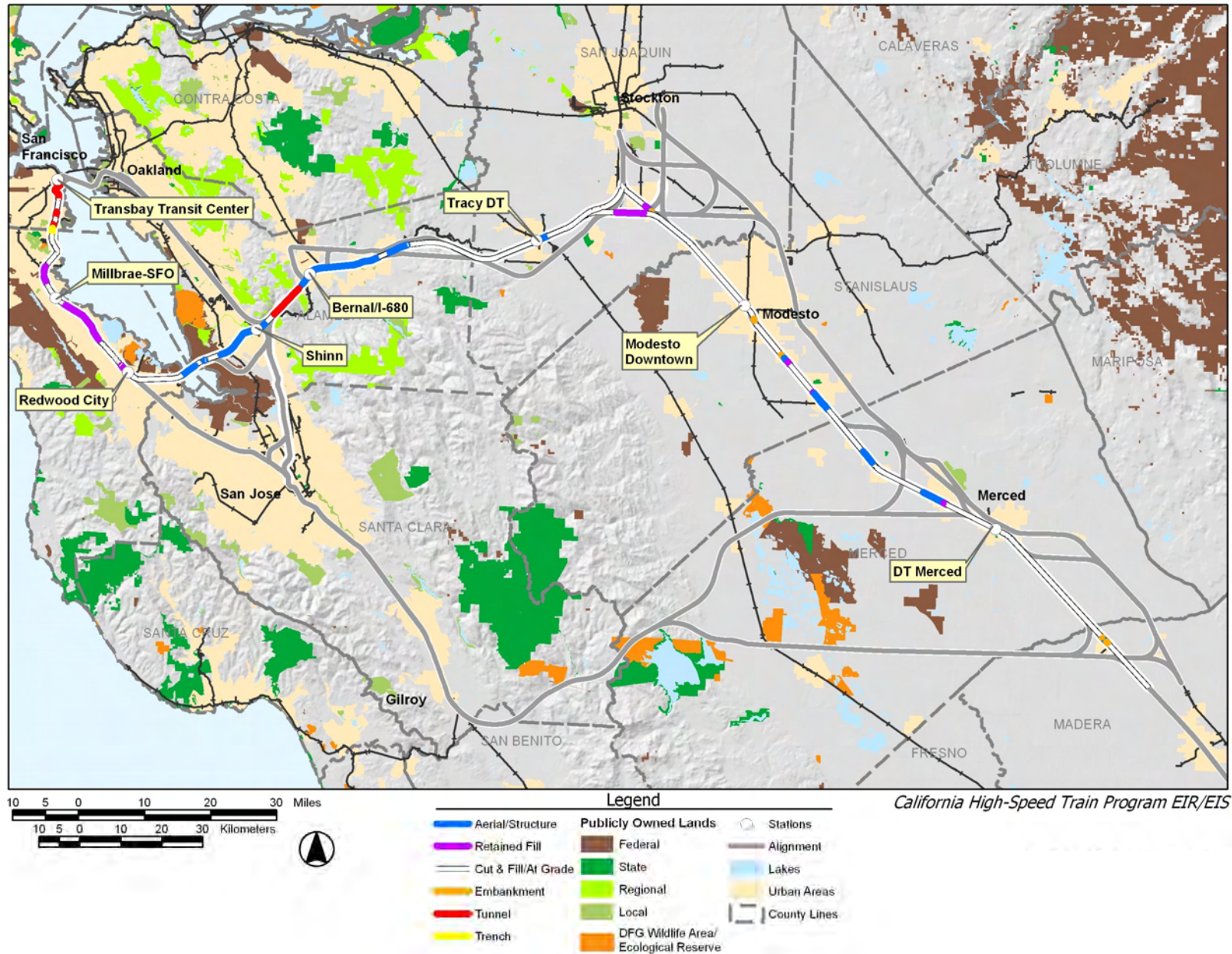
**Table 7.2-5**  
**Altamont Pass: San Francisco Terminus**

<b>Physical/Operational Characteristics</b>	
<b>Network Alternative Description</b>	From San Francisco to Redwood City, this network alternative would use the existing Caltrain rail right-of-way north of Redwood City and would cross the San Francisco Bay in the Dumbarton Corridor. The Altamont Pass would use the UPRR Alignment through downtown Tracy, and the Central Valley would use the UPRR N/S Alignment. Station location options considered for this alternative are Transbay Transit Center, Millbrae/SFO, Redwood City (Caltrain), Pleasanton (I-680/Bernal Road), Tracy (Downtown), Modesto (Downtown), and Merced (Downtown).
<b>Length</b>	191.55 mi (308.27 km)
<b>Cost (dollars)</b>	\$11.0 billion
<b>Express Travel Times (minutes)</b>	SF-LA=2:36; SF-Sac=1:06; SF-Fresno=1:18; Livermore-LA=2:06; Tracy-LA=1:59; SF-Tracy=0:42
<b>Ridership</b>	This network alternative would directly serve downtown San Francisco and San Francisco International Airport (SFO), Union City, the I-580 corridor, and the Central Valley. Although this network alternative does not directly serve Oakland or San Jose, it provides high ridership and revenue because of the high frequency of service provided to San Francisco. Total ridership and revenue for the statewide HST system with this network alternative is forecast to be 93.9 million passengers and \$3.13 billion per year by 2030. Ridership for this network alternative is forecast to be about 6.8% higher than the Altamont "Base Case" network alternative and with revenue about 10% higher.
<b>Constructability</b>	Constructing a new bridge crossing along the Dumbarton corridor would involve major construction activities in sensitive wetlands, saltwater marshes, and aquatic habitat. Special construction methods and mitigations would be required. Portions of this network alternative are aligned in or along existing passenger rail lines. Maintaining operations on the existing passenger rail service while constructing grade separations, tunnels, elevated sections, and stations would involve major construction issues/challenges. However, the HST infrastructure could be constructed incrementally to minimize impact to existing operations.
<b>O &amp; M Cost (dollars per year)</b>	\$1,124 million
<b>Operational Issues</b>	Average speed SF-LA=168.8 mph (281.2 kph); SF-Sac=129.5 mph (215.8 kph); SF-Fresno=148 mph (246.7 kph); Livermore-LA=182.9 mph (304.8 kph); Tracy-LA=183.4 mph (305.7 kph); SF-Tracy=107.1 mph (178.5 kph) Maximum speed

<sup>11</sup> Does not include "Dumbarton Wye South to Caltrain" segment.

**Table 7.2-5**  
**Altamont Pass: San Francisco Terminus**

	<p>SF-LA=210 mph (350 kph); SF-Sac=198 mph (330 kph); SF-Fresno=210 mph (350 kph); Livermore-LA=210 mph (350 kph); Tracy-LA=210 mph (350 kph); SF-Tracy=169.2 mph (282 kph)</p> <p>HST operations would need to be coordinated and integrated with Caltrain service on the SF Peninsula and ACE service in the I-580 corridor.</p>
<b>Potential Environmental Impacts</b>	
<b>Travel Conditions</b>	<p>The Caltrain corridor Alignment would bring direct HST service up the San Francisco Peninsula to downtown San Francisco with potential stations in downtown San Francisco, at SFO (Millbrae), a mid-Peninsula station at Redwood City, a Tri-Valley in Pleasanton (I-680/Bernal Road) Station, a downtown station in Tracy, and Central Valley stations in Modesto and Merced. This network alternative would increase connectivity and accessibility to San Francisco, the northern Peninsula and SFO, the hub international airport for northern California, southern Alameda County, the I-580 Corridor and Tri-Valley area, and the Central Valley. The HST Network Alternative would provide a safer, more reliable, energy-efficient intercity mode along the San Francisco Peninsula and in the Tri-Valley while improving the safety, reliability, and performance of the regional commuter service to San Francisco. The HST Network Alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic. The fully grade-separated Caltrain corridor north of Redwood City would improve local traffic flow and reduce air pollution at existing rail crossings. There would also be some grade separation benefits in the UPRR in the I-580 corridor and UPRR N/S Alignment through the Central Valley. This network alternative would not provide direct HST service to Oakland, Oakland Airport, San Jose, and south Santa Clara County resulting in considerably less Travel Conditions benefits (travel times, reliability, safety, connectivity, and passenger cost) than other network alternatives that directly serve additional stations/markets in the Bay Area.</p>
<b>Noise and Vibration:</b> <sup>i</sup> High, medium, or low potential impacts	<p>Medium potential of noise impacts for the overall alternative, with a high potential of noise impacts in the Dumbarton Corridor. Medium potential of vibration impacts for the overall alternative. Medium potential of vibration impacts, from San Francisco to downtown Tracy and a low potential in the Central Valley.</p>
<b>Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice</b>	<p><b>Compatibility:</b> Majority of network alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. It exhibits low compatibility where it does not follow a transportation right-of-way in the Altamont Pass area. It exhibits a medium to high compatibility where it crosses the San Francisco Bay, in Fremont along the more narrow Centerville line, in the Shinn area. It has a medium compatibility in the Lathrop, Manteca, Modesto and Merced areas.</p> <p><b>Environmental Justice:</b> This network alternative has a low environmental justice impact rating for the UPRR alignment from Niles Canyon to the Central Valley. Environmental justice impact is rated as medium in the Central Valley except in the Manteca area, where the impact rating is low.</p> <p><b>Community:</b> This network alternative would not affect community cohesion, given that the majority of the alignment is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p><b>Property:</b> This network alternative has the potential for high property impacts in the Niles Canyon, Shinn, and Manteca areas, where additional right-of-way would be required.</p>



**Figure 7.2-5**  
**Network Alternatives**  
**Altamont Pass**  
**San Francisco Terminus**





**Table 7.2-5  
Altamont Pass: San Francisco Terminus**

<b>Aesthetics and Visual Resources:</b> General impacts and rating.	Segments visual ratings: (1) Caltrain – San Francisco to Dumbarton =low; (2) UPRR =medium; (3) Tracy Downtown =low; (4) Dumbarton High Bridge =medium; (5) UPRR N/S =low. Overall network alternative rating is low to medium.
<b>Farmlands:</b> <sup>ii</sup> Ac (ha) potentially affected	Farmland: 757.8 ac (306.68 ha)  Impact up to 422.7 ac (171.05 ha) of prime farmland. The majority of potential farmland impacts would occur along the Tracy and the UPRR (North/South) segments. Overall, this network alternative would have moderate impacts to farmland within the Altamont Pass network alternatives.
<b>Cultural Resources and Paleontological Resources:</b> <sup>iii</sup> Potential presence of historical resources in area of potential effect	There are 146 known cultural resources.  This network alternative extends through numerous historic districts in San Francisco. Historic properties and buildings dating from the 1900s are within the area of potential effects along with water delivery systems and canals dating from the 1890s, freeway bridges dating from the 1940s, and residential properties dating from the 1890s. Archaeological resources in the area of the Dumbarton crossing include prehistoric sites associated with burials, and historic sites from early 1900s industrial activities. Overall, this network alternative was identified as having a moderate sensitivity for cultural resources.
<b>Hydrology and Water Resources:</b> <sup>iv</sup> Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	Floodplains: 270.7 ac (109.57 ha) direct/ 817.1 ac (330.68 ha) indirect Streams: 15,995 linear ft (4,875.1 linear m) direct/ 67,867 linear ft (20,685.76 linear m) indirect Lakes/Waterbodies: 39.6 ac (16.03 ha) direct/ 154.9 ac (62.68 ha) indirect  Potentially affect the San Francisco Bay, San Joaquin River, Stanislaus River, Tuolumne River, Merced River, and Chowchilla River as well as the South Bay Aqueduct and California Aqueduct among other water resources. Includes tunnels that would avoid impacts on the floodplain and above ground water resources, and aerial structures that would minimize impact on floodplains and streams, creeks, and channels.
<b>Biological Resources Including Wetlands</b> Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	Wetlands <sup>v</sup> : 44.4 ac (17.97 ha) direct/ 2,259 ac (914.4 ha) indirect Non-Wetland Waters: 15,947 linear ft (4,860.6 linear m) Species: 56 special-status plant and 49 special-status wildlife species  This alternative could potentially result in impacts on biological resources in San Francisco Bay as a result of the Dumbarton crossing. Potentially significant impacts on special-status plant and wildlife species, wetlands, and waters. Network alternative would be along existing transportation corridors with some portions in new rail corridors. Potentially result in a barrier to the movement of wildlife in areas where it severs wildlife movement corridors. Conflict with conservation and restoration plans and special management areas, such as the Don Edwards San Francisco Bay National Wildlife Refuge. The placement of the alignment and stations and use of tunnels and aerial structures would minimize impacts on biological resources.
<b>Fault Crossings</b>	San Bruno (Potentially Active) – At Grade Calaveras (Active) – Tunnel Livermore (Potentially Active) – Above Grade Greenville (Active) – Above Grade

**Table 7.2-5**  
**Altamont Pass: San Francisco Terminus**

	<p>Vernalis (Active) – At Grade          Buried Trace of Unnamed Fault (Potentially Active) - At Grade          Silver Creek (Potentially Active) - At Grade          Hayward (Active) - Above Grade          Mission (Potentially Active) - At Grade</p>
<p><b>Section 4(f) and 6(f) Resources:</b><sup>4</sup>          Number of resources rated high potential direct effects</p>	<p>There are 24 public parks, recreation lands, wildlife and waterfowl refuges that are 0–150 ft (46 m) from center of the network alternative. Few potential direct impacts are anticipated given that much of the network alternatives is within or directly adjacent to existing transportation rights-of-way, and few resources exist in areas where the network alternative is not adjacent to or within this existing right-of-way. Exceptions include the Augustin-Bernal Park.</p>

## F. OAKLAND TERMINUS

This network alternative is shown in Figure 7.2-6 and described in Table 7.2-6. The segments used for this representative alternative are Niles/I-880 (West Oakland to Niles Junction), East Bay Connection (Dumbarton/Niles XN), UPRR (Niles to Altamont), Tracy Downtown (UPRR Connection), and UPRR (Central Valley).

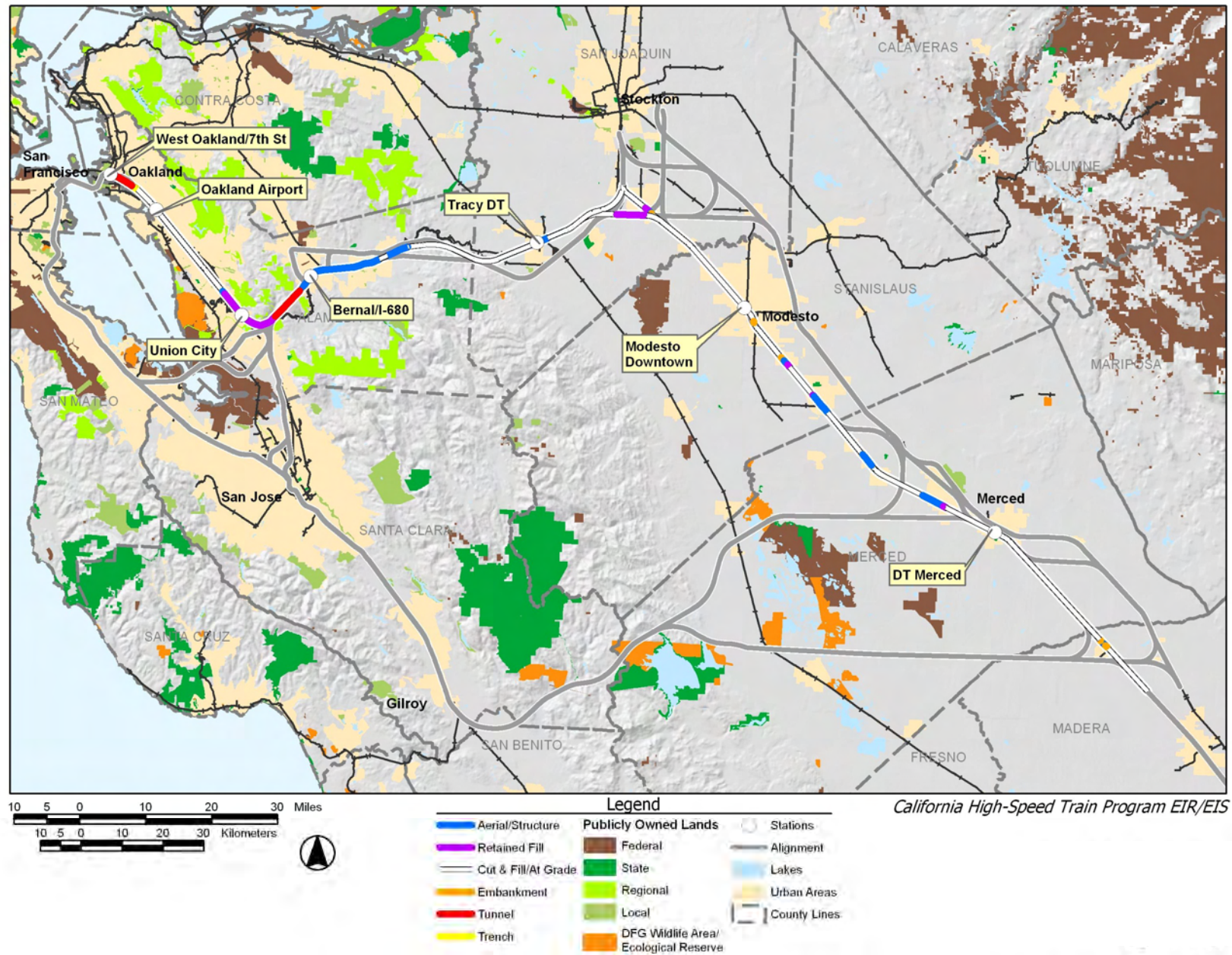
**Table 7.2-6**  
**Altamont Pass: Oakland Terminus**

<b>Physical/Operational Characteristics</b>	
<b>Network Alternative Description</b>	From Oakland to Union City, this network alternative would use the Niles/I-800 Alignment north of Niles. The Altamont Pass would use the UPRR Alignment through downtown Tracy, and the Central Valley would use the UPRR N/S Alignment. Station location options considered for this alternative are West Oakland/7 <sup>th</sup> Street, Coliseum/Airport, Union City (BART), Pleasanton (I-680/Bernal Road), Tracy (Downtown), Modesto (Downtown), and Merced (Downtown).
<b>Length</b>	170.86 mi (274.97 km)
<b>Cost (dollars)</b>	\$8.2 billion
<b>Express Travel Times (minutes)</b>	Oakland-LA=2:23; Oakland-Sac=0:53; Oakland-Fresno=1:04; Livermore-LA=2:06; Tracy-LA=1:59; Oakland-Tracy=0:29
<b>Ridership</b>	This network alternative would directly serve downtown Oakland and Oakland International Airport (Coliseum/BART), the I-580 corridor, and the Central Valley. Although this network alternative does not directly serve San Jose or San Francisco, it provides high ridership and revenue because of the high frequency of service provided to Oakland. Total ridership and revenue for the statewide HST system with this network alternative is forecast to be 94.4 million passengers and \$3.15 billion per year by 2030. Ridership for this network alternative is forecast to be about 7.4% higher than the Altamont "Base Case" network alternative and revenue to be about 10.9% higher.
<b>Constructability</b>	Portions of this network alternative are aligned in or along existing passenger rail lines. Maintaining operations on the existing passenger rail service while constructing grade separations, tunnels, elevated sections, and stations would involve major construction issues/challenges. However, the HST infrastructure could be constructed incrementally to minimize impact to existing operations.
<b>O &amp; M Cost (dollars per year)</b>	\$1,093 million
<b>Operational Issues</b>	<p>Average Speed</p> <p>Oakland-LA=176.3 mph (293.8 kph); Oakland-Sac=140.1 mph (233.5 kph); Oakland-Fresno=162.9 mph (271.6 kph); Livermore-LA=182.9 mph (304.8 kph); Tracy-LA=183.4 mph (305.7 kph); Oakland-Tracy=116.6 mph (194.3 kph)</p> <p>Maximum Speed</p> <p>Oakland-LA=210 mph (350 kph); Oakland-Sac=198 mph (330 kph); Oakland-Fresno=210 mph (350 kph); Livermore-LA=210 mph (350 kph); Tracy-LA=210 mph (350 kph); Oakland-Tracy=178.2 mph (297 kph)</p>

**Table 7.2-6  
Altamont Pass: Oakland Terminus**

	HST operations would need to be coordinated and integrated with ACE service in the I-580 corridor.
<b>Potential Environmental Impacts</b>	
<b>Travel Conditions</b>	The Niles/I-880 Alignment would bring direct HST service up the East Bay to Oakland, with station in West Oakland, the Oakland International Airport (Coliseum/BART), the I-580 corridors with a station in Pleasanton (I-680/Bernal Road), downtown Tracy, and Central Valley stations in Modesto and Merced. This network alternative would increase connectivity and accessibility to Oakland, the Oakland International Airport (Coliseum/BART), southern Alameda County, the I-580 Corridor and Tri-Valley area, and the Central Valley. The HST Network Alternative would provide a safer, more reliable, energy-efficient intercity mode, while improving the safety, reliability, and performance of the regional commuter service to Oakland. The HST Network Alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic. The fully grade-separated Niles/I-880 Alignment between Oakland and Union City, UPRR in the I-580 corridor and UPRR N/S Alignment through the Central Valley would improve local traffic flow and reduce air pollution at existing rail crossings. This network alternative would not provide direct HST service to San Francisco, SFO, the SF Peninsula/Caltrain Corridor, San Jose, and south Santa Clara County resulting in considerably less Travel Conditions benefits (travel times, reliability, safety, connectivity, and passenger cost) than other network alternatives that directly serve additional stations/markets in the Bay Area.
<b>Noise and Vibration:</b> <sup>i</sup> High, medium, or low potential impacts	Medium potential of noise impacts for the overall alternative. Medium potential of vibration impacts for the overall alternative. High potential of vibration impacts from Oakland to Niles Junction. Medium potential of vibration impacts, from Niles Junction to downtown Tracy and a low potential in the Central Valley.
<b>Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice</b>	<p><b>Compatibility:</b> Majority of network alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. It exhibits low compatibility where it does not follow a transportation right-of-way in the Altamont Pass area. It has a medium compatibility in the Lathrop, Manteca Modesto and Merced areas.</p> <p><b>Environmental Justice:</b> This network alternative has medium environmental justice impact rating in the east bay between Niles Junction and Oakland and a low environmental justice impact rating for the UPRR alignment from Niles Canyon to the Central Valley. Environmental justice impact is rated as medium in the Central Valley except in the Manteca area, where the impact rating is low.</p> <p><b>Community:</b> This network alternative would not affect community cohesion, given that the majority of the alignment is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p><b>Property:</b> This network alternative has the potential for high property impacts in the Niles Canyon and Manteca areas, where additional right-of-way would be required.</p>
<b>Aesthetics and Visual Resources:</b> General impacts and rating.	Segments visual ratings: (1) Oakland to Niles Junction =low; (2) UPRR =medium; (3) Tracy Downtown =low; (4) UPRR N/S =low. Overall network alternative rating is low to medium





**Figure 7.2-6**  
**Network Alternatives**  
**Altamont Pass**  
**Oakland Terminus**





**Table 7.2-6  
Altamont Pass: Oakland Terminus**

<b>Farmlands:</b> <sup>ii</sup> Ac (ha) potentially affected	<p>Farmland: 755.5 ac (305.73 ha)</p> <p>Impact up to 420.3 ac (170.11 ha) of prime farmland. The majority of potential farmland impacts would occur along the Tracy and the UPRR (North/South) segments. Overall, this network alternative along with the Union City Terminus and Oakland, and San Francisco via transbay tube network alternatives would have the Least Potential Impact (LPI) to farmland within the Altamont Pass network alternatives.</p>
<b>Cultural Resources and Paleontological Resources:</b> <sup>iii</sup> Potential presence of historical resources in area of potential effect	<p>There are 112 known cultural resources.</p> <p>Historic properties and industrial complexes dating from the 1920s and 1940s are within the area of potential effects along with water delivery systems and canals dating from the 1890s, freeway bridges dating from the 1940s, and residential properties dating from the 1880s. Overall, this network alternative was identified as having a low sensitivity for cultural resources.</p>
<b>Hydrology and Water Resources:</b> <sup>iv</sup> Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	<p>Floodplains: 181.1 ac (73.29 ha) direct/ 568.2 ac (229.94 ha) indirect</p> <p>Streams: 16,831 linear ft (5,130.0 linear m) direct/ 73,451 linear ft (22,387.96 linear m) indirect</p> <p>Lakes/Waterbodies: 2.3 ac (0.93 ha) direct/ 7.6 ac (3.08 ha) indirect</p> <p>Of the Altamont Pass network alternatives, this network alternative along with four other network alternatives was identified to have the least area of impact on lakes and would not result in impacts on San Francisco Bay.</p> <p>Potentially affect San Joaquin River, Stanislaus River, Tuolumne River, Merced River, and Chowchilla River as well as the South Bay Aqueduct and California Aqueduct among other water resources. Includes tunnels that would avoid impacts on the floodplain and above ground water resources, and aerial structures that would minimize impact on floodplains and streams, creeks, and channels.</p>
<b>Biological Resources Including Wetlands</b> Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	<p>Wetlands<sup>v</sup>: 10.8 ac (4.35 ha) direct/ 539 ac (217.9 ha) indirect</p> <p>Non-Wetland Waters: 13,502 linear ft (4,115.5 linear m)</p> <p>Species: 39 special-status plant and 44 special-status wildlife species</p> <p>Of the Altamont Pass network alternatives, this network alternative along with one other network alternatives was identified to have the least area of impact on wetlands and would not result in impacts on San Francisco Bay. Potentially significant impacts to special-status plant and wildlife species and wetlands and waters.</p> <p>Network alternative would be along existing transportation corridors with some portions in new rail corridors. Potentially result in a barrier to the movement of wildlife in areas where it severs wildlife movement corridors. Conflict with conservation and restoration plans and special management areas. The placement of the alignment and stations and use of tunnels and aerial structures would minimize impacts on biological resources.</p>
<b>Fault Crossings</b>	<p>Hayward (Active) – At Grade - Adjacent and Parallel</p> <p>Calaveras (Active) – Tunnel</p> <p>Livermore (Potentially Active) – Above Grade</p> <p>Greenville (Active) – Above Grade</p> <p>Vernalis (Active) – At Grade</p>

**Table 7.2-6  
Altamont Pass: Oakland Terminus**

<p><b>Section 4(f) and 6(f) Resources:</b><sup>4</sup> Number of resources rated high potential direct effects</p>	<p>There are 21 public parks, recreation lands, wildlife and waterfowl refuges that are 0–150 ft (46 m) from center of the network alternative. Few potential direct impacts are anticipated given that much of the network alternatives is within or directly adjacent to existing transportation rights-of-way, and few resources exist in areas where the network alternative is not adjacent to or within this existing right-of-way. Exceptions include the Augustin-Bernal Park.</p>
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## G. UNION CITY TERMINUS

This network alternative is shown in Figure 7.2-7 and described in Table 7.2-7. The segments used for this representative alternative are Niles/I-880 (Union City BART to Niles Junction), East Bay Connection (Dumbarton/Niles XN), UPRR (Niles to Altamont), Tracy Downtown (UPRR Connection), and UPRR (Central Valley).

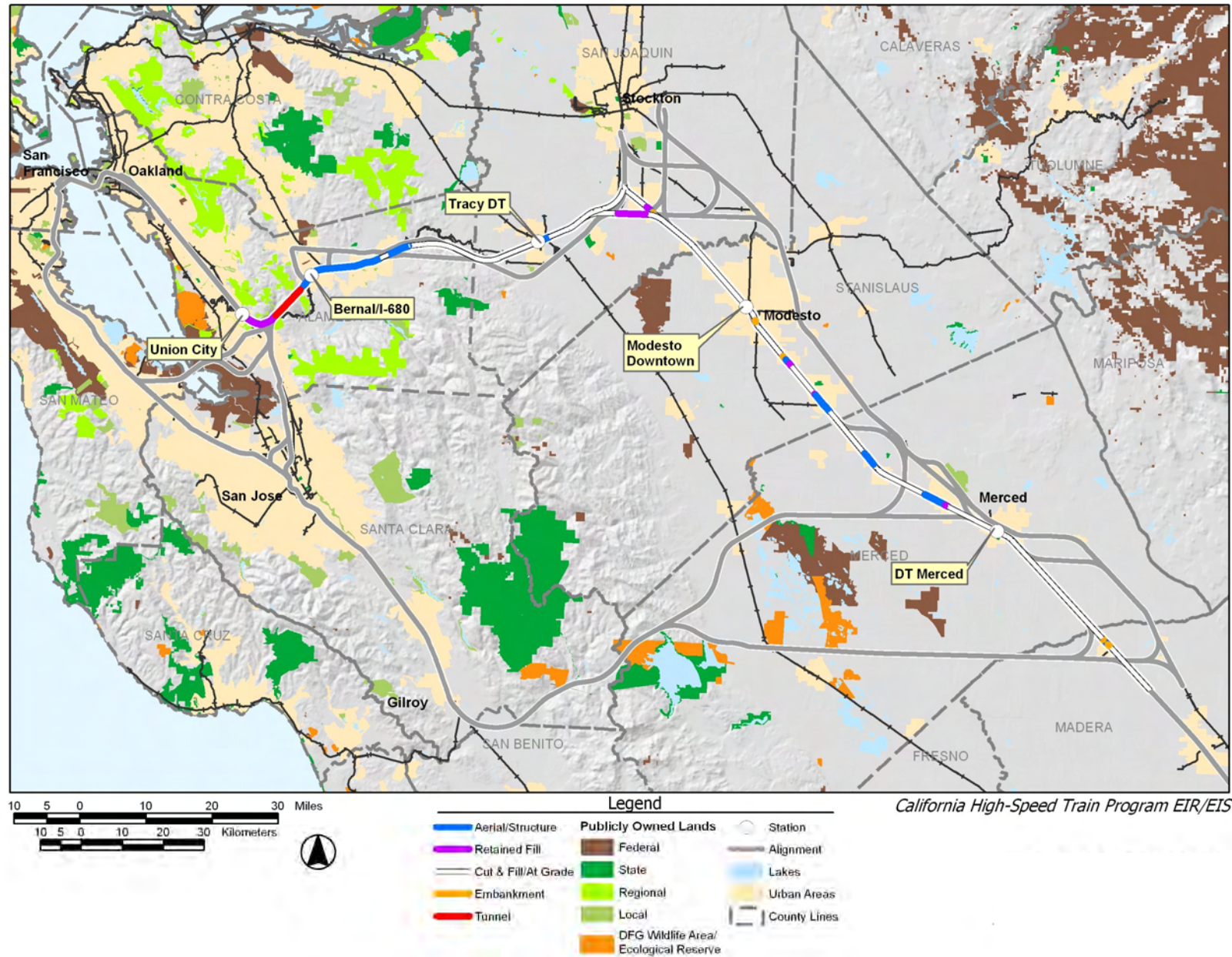
**Table 7.2-7**  
**Altamont Pass: Union City Terminus**

<b>Physical/Operational Characteristics</b>	
<b>Network Alternative Description</b>	From Union City, the Altamont Pass Alignment would follow the UPRR through downtown Tracy, and the Central Valley would use the UPRR N/S Alignment. Station location options considered for this alternative are Union City (BART), Pleasanton (I-680/Bernal Road), Tracy (Downtown), Modesto (Downtown), and Merced (Downtown).
<b>Length</b>	157.93 mi (254.16 km)
<b>Cost (dollars)</b>	\$6.0 billion
<b>Express Travel Times (minutes)</b>	Union-LA=2:13; Union-Sac=0:43; Union-Fresno=0:55; Livermore-LA=2:06; Tracy-LA=1:59; Union-Tracy=0:20
<b>Ridership</b>	This network alternative would serve Union City and connect to BART and the I-580 corridor and would have less ridership and revenue potential than network alternatives that provide direct service to additional stations in the Bay Area. Total ridership and revenue for the statewide HST system with this network alternative is forecast to be 83.5 million passengers and \$2.70 billion per year by 2030. Ridership and revenue for this network alternative is forecast to be about 5% less than the Altamont "Base Case" network alternative.
<b>Constructability</b>	Portions of this network alternative are aligned in or along existing passenger rail lines. Maintaining operations on the existing passenger rail service while constructing grade separations, tunnels, elevated sections, and stations would involve major construction issues/challenges. However, the HST infrastructure could be constructed incrementally to minimize impact to existing operations.
<b>O &amp; M Cost (dollars per year)</b>	\$1,073 million
<b>Operational Issues</b>	<p>Average Speed</p> <p>Union-LA=180.2 mph (300.3 kph); Union-Sac=143.8 mph (239.6 kph); Union-Fresno=167 mph (278.28 kph); Livermore-LA=182.9 mph (304.8 kph); Tracy-LA=183.4 mph (305.7 kph); Union-Tracy=106.8 mph (178 kph)</p> <p>Maximum Speed</p> <p>Union-LA=210 mph (350 kph); Union-Sac=198 mph (330 kph); Union-Fresno=210 mph (350 kph); Livermore-LA=210 mph (350 kph); Tracy-LA=210 mph (350 kph); Union-Tracy=169.2 mph (282 kph)</p> <p>HST operations would need to be coordinated and integrated with all transportation services at Union City. HST operations would need to be coordinated and integrated with ACE service in the I-580 corridor.</p>



**Table 7.2-7  
Altamont Pass: Union City Terminus**

<b>Potential Environmental Impacts</b>	
<b>Travel Conditions</b>	This network alternative would bring direct HST service to the East Bay, Tri-Valley, and Central Valley areas with an East Bay Station in Union City (BART), a Tri-Valley in Pleasanton (I/680/Bernal Road), a downtown station in Tracy, and Central Valley stations in Modesto and Merced. This network alternative would increase connectivity and accessibility to southern Alameda County, the I-580 Corridor and Tri-Valley area, and the Central Valley. The HST Network alternative would provide a safer, more reliable, energy-efficient intercity mode along the UPRR Alignment while improving the safety, reliability, and performance of the regional commuter service. The HST Network Alternative would increase the capacity for intercity and commuter travel and reduce existing automobile traffic. The fully grade-separated UPRR in the I-580 corridor and UPRR N/S Alignment through the Central Valley would improve local traffic flow and reduce air pollution at some existing rail crossings. This network alternative would not provide direct HST service to San Francisco, SFO, the SF Peninsula/Caltrain Corridor, Oakland, Oakland Airport, San Jose, and south Santa Clara County resulting in considerably less Travel Conditions benefits (travel times, reliability, safety, connectivity, and passenger cost) than other network alternatives that directly serve additional stations/markets in the Bay Area.
<b>Noise and Vibration:</b> <sup>i</sup> High, medium, or low potential impacts	Medium potential of noise impacts for the overall alternative. Medium potential of vibration impacts for the overall alternative. High potential of vibration impacts from Union City to Niles Junction. Medium potential of vibration impacts, from Niles Junction to downtown Tracy and a low potential in the Central Valley.
<b>Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice</b>	<p><b>Compatibility:</b> Majority of network alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. It exhibits low compatibility where it does not follow a transportation right-of-way in the Altamont Pass area. It has a medium compatibility in the Lathrop, Manteca, Modesto and Merced areas.</p> <p><b>Environmental Justice:</b> This network alternative has a low environmental justice impact rating for the UPRR alignment from Niles Canyon to the Central Valley. Environmental justice impact is rated as medium in the Central Valley except in the Manteca area, where the impact rating is low.</p> <p><b>Community:</b> This network alternative would not affect community cohesion, given that the majority of the alignment is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p><b>Property:</b> This network alternative has the potential for high property impacts in the Niles Canyon and Manteca areas, where additional right-of-way would be required.</p>
<b>Aesthetics and Visual Resources:</b> General impacts and rating	Segments visual ratings: (1) UPRR =medium; (2) Tracy Downtown =low; and (3) UPRR N/S =low. Overall network alternative rating is low to medium.
<b>Farmlands:</b> <sup>ii</sup> Ac (ha) potentially affected	<p>Farmland: 755.5 ac (305.73 ha)</p> <p>Impact up to 420.3 ac (170.11 ha) of prime farmland. The majority of potential farmland impacts would occur along the Tracy and the UPRR (North/South) segments. Overall, this network alternative along with the Oakland Terminus and Oakland, and San Francisco via transbay tube network alternatives would have the Least Potential Impact to farmland within the Altamont Pass network alternatives.</p>



**Figure 7.2-7**  
**Network Alternatives**  
**Altamont Pass**  
**Union City Terminus**



**Table 7.2-7  
Altamont Pass: Union City Terminus**

<b>Cultural Resources and Paleontological Resources:</b> <sup>iii</sup> Potential presence of historical resources in area of potential effect	<p>There are 88 known cultural resources.</p> <p>Of the Altamont Pass network alternatives, this network alternative was identified to have the least number of known resources.</p> <p>Historic properties and industrial complexes dating from the 1920s and 1940s are within the area of potential effects along with water delivery systems and canals dating from the 1890s, freeway bridges dating from the 1940s, and residential properties dating from the 1880s. Overall, this network alternative was identified as having a low sensitivity for cultural resources.</p>
<b>Hydrology and Water Resources:</b> <sup>iv</sup> Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	<p>Floodplains: 177.6 ac (71.88 ha) direct/ 561.4 ac (227.20 ha) indirect</p> <p>Streams: 14,432 linear ft (4,398.9 linear m) direct/ 65,198 linear ft (19,872.48 linear m) indirect</p> <p>Lakes/Waterbodies: 2.3 ac (0.93 ha) direct/ 7.6 ac (3.08 ha) indirect</p> <p>Of the Altamont Pass network alternatives, this network alternative was identified to have the least amount of impact on water resources including streams and rivers as well as lakes, floodplains, groundwater, and impaired waters.</p> <p>Potentially affect San Joaquin River, Stanislaus River, Tuolumne River, Merced River, and Chowchilla River as well as the South Bay Aqueduct and California Aqueduct among other water resources. Includes tunnels that would avoid impacts on the floodplain and above ground water resources, and aerial structures that would minimize impact on floodplains and streams, creeks, and channels.</p>
<b>Biological Resources Including Wetlands</b> Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	<p>Wetlands<sup>v</sup>: 10.7 ac (4.31 ha) direct/ 499 ac (202.0 ha) indirect</p> <p>Non-Wetland Waters: 13,113 linear ft (3,996.7 linear m)</p> <p>Species: 38 special-status plant and 36 special-status wildlife species</p> <p>Of the Altamont Pass network alternatives, this network alternative would have the potential to impact the least special-status plant and wildlife species, wetlands, and waters. This network alternative would not result in impacts on San Francisco Bay. Potentially significant impacts to special-status plant and wildlife species and wetlands and waters.</p> <p>Network alternative would be along existing transportation corridors with some portions in new rail corridors. Potentially result in a barrier to the movement of wildlife in areas where it severs wildlife movement corridors. Conflict with conservation and restoration plans and special management areas. The placement of the alignment and stations and use of tunnels and aerial structures would minimize impacts on biological resources.</p>
<b>Fault Crossings</b>	<p>Calaveras (Active) – Tunnel</p> <p>Livermore (Potentially Active) – Above Grade</p> <p>Greenville (Active) – Above Grade</p> <p>Vernalis (Active) – At Grade</p>
<b>Section 4(f) and 6(f) Resources:</b> <sup>4</sup> Number of resources rated high potential direct effects	<p>There are 18 public parks, recreation lands, wildlife and waterfowl refuges that are 0–150 ft (46 m) from center of the network alternative. Few potential direct impacts are anticipated given that much of the network alternatives is within or directly adjacent to existing transportation rights-of-way, and few resources exist in areas where the network alternative is not adjacent to or within this existing right-of-way. Exceptions include the Augustin-Bernal Park.</p>

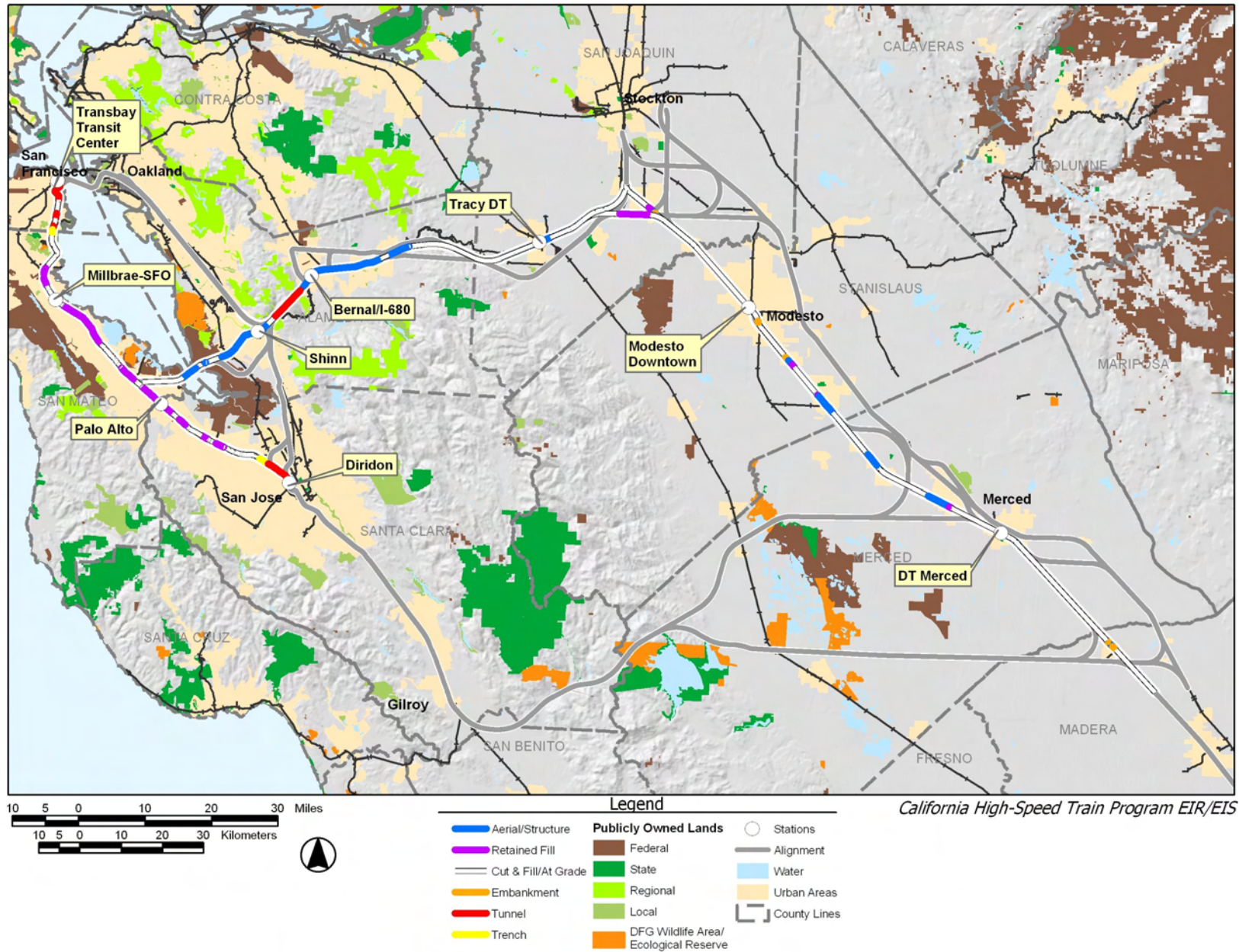
#### H. SAN FRANCISCO AND SAN JOSE – VIA SF PENINSULA

This network alternative is shown in Figure 7.2-8 and described in Table 7.2-8. The segments used for this representative alternative are Caltrain Corridor (SF to Dumbarton), Caltrain (Dumbarton to San Jose), Dumbarton (High Bridge), UPRR (Niles to Altamont), Tracy Downtown (UPRR Connection), and UPRR (Central Valley).

**Table 7.2-8**  
**Altamont Pass: San Francisco and San Jose – via San Francisco Peninsula**

<b>Physical/Operational Characteristics</b>	
<b>Network Alternative Description</b>	This network alternative would cross the San Francisco Bay in the Dumbarton corridor. From San Francisco to San Jose, this network alternative would use the existing Caltrain Alignment. The Altamont Pass Alignment would follow the UPRR through downtown Tracy, and the Central Valley would use the UPRR N/S Alignment. Station location options considered for this alternative are Transbay Transit Center, Millbrae/SFO, Palo Alto (Caltrain), Union City (Shinn), San Jose (Diridon), Pleasanton (I-680/Bernal Road), Tracy (Downtown), Modesto (Downtown), and Merced (Downtown).
<b>Length</b>	213.30 mi (343.27 km)
<b>Cost (dollars)</b>	\$12.6 billion
<b>Express Travel Times (minutes)</b>	SF–LA=2:36; SJ–LA=2:37; SF–Sac=1:06; SJ–Sac=1:03; SF–Fresno=1:18; SJ–Fresno=1:15; Livermore–LA=2:06; Tracy–LA=1:59; SF–Tracy=0:42; SJ–Tracy=0:39
<b>Ridership</b>	This network alternative would directly serve downtown San Francisco and San Francisco International Airport (SFO), San Jose, the I-580 corridor, and the Central Valley resulting in high ridership and revenue. Total ridership and revenue for the statewide HST system with this network alternative is forecast to be 90.8 million passengers and \$2.74 billion per year by 2030. Ridership for this network alternative is forecast to be 3.2% more than the Altamont “Base Case” network alternative, and revenue is forecast to be 3.6% less than the base case network alternative.
<b>Constructability</b>	Constructing a new bridge crossing along the Dumbarton corridor would involve major construction activities in sensitive wetlands, saltwater marshes, and aquatic habitat. Special construction methods and mitigations would be required. Portions of this network alternative are aligned in or along existing passenger rail lines. Maintaining operations on the existing passenger rail service while constructing grade separations, tunnels, elevated sections, and stations would involve major construction issues/challenges. However, the HST infrastructure could be constructed incrementally to minimize impact to existing operations.
<b>O &amp; M Cost (dollars per year)</b>	\$1,115 million





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**Figure 7.2-8**  
**Network Alternatives**  
**Altamont Pass**  
**San Francisco and San Jose—via SF Peninsula**



**Table 7.2-8**  
**Altamont Pass: San Francisco and San Jose – via San Francisco Peninsula**

<b>Operational Issues</b>	<p>Average Speed  SF–LA=168.8 mph (281.2 kph); SJ–LA=171.2 mph (285.4 kph); SF–Sac=129.5 mph (215.8 kph); SJ–Sac=144.5 mph (240.8 kph); SF–Fresno=148.0 mph (246.7 kph); SJ–Fresno=161.4 mph (269 kph); Livermore–LA=182.9 mph (304.8 kph); SJ–Tracy=129.7 mph (216.1 kph); SF–Tracy=107.1 (178.5 kph)</p> <p>Maximum Speed  SF–LA=210 mph (350 kph); SJ–LA=210 mph (350 kph); SF–Sac=198 mph (330 kph); SJ–Sac=198_ mph (330 kph); SF–Fresno=210 mph (350 kph); SJ–Fresno=210 mph (350 kph); Livermore–LA=210 mph (350 kph); SJ–Tracy=171 mph (285_ kph); SF–Tracy=169.2 mph (282 kph); Tracy–LA=210 mph (350 kph)</p> <p>This network alternative would require the system to split in two separate directions to serve both San Jose and San Francisco given a constant number of trains. This decreases the frequency of service from southern California to these stations by a factor of two as compared to network alternatives using the Pacheco Pass alignment options. Based on forecasted travel demand, two-thirds of the trains were directed to San Francisco and one-third of the trains were directed to San Jose.</p> <p>HST operations would need to be coordinated and integrated with Caltrain service on the SF Peninsula and ACE service in the I-580 corridor.</p>
<b>Potential Environmental Impacts</b>	
<b>Travel Conditions</b>	<p>The Caltrain corridor Alignment would bring direct HST service up the San Francisco Peninsula to downtown San Francisco with potential stations in downtown San Francisco, at SFO (Millbrae), a mid-Peninsula station at Palo Alto, a station in San Jose (Diridon). It would serve the East Bay with a station in Union City (Shinn), the Tri-Valley with a station in Pleasanton (I-680/Bernal Road), a downtown Tracy station, and Central Valley Station in Modesto and Merced. This network alternative would increase connectivity and accessibility to San Francisco, the Peninsula and SFO, the hub international airport for northern California, southern Alameda County, San Jose, the I-580 Corridor and Tri-Valley area, and the Central Valley. The HST Network Alternative would provide a safer, more reliable, energy-efficient intercity mode along the San Francisco Peninsula, the I-580 Corridor and the Central Valley while improving the safety, reliability, and performance of the regional commuter service. The HST Network Alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic. The fully grade-separated Caltrain corridor would improve local traffic flow and reduce air pollution at existing rail crossings. There would also be grade separation benefits in the UPRR in the I-580 corridor and UPRR N/S Alignment through the Central Valley. This network alternative would not provide direct HST service to Oakland, Oakland Airport, and south Santa Clara County.</p>
<b>Noise and Vibration:</b> <sup>i</sup> High, medium, or low potential impacts	<p>Medium potential of noise impacts for the overall alternative, with a high potential of noise impacts in the Dumbarton Corridor. Medium potential of vibration impacts for the overall alternative. Medium potential of vibration impacts, from San Francisco to Dumbarton and High potential of impacts from Dumbarton to San Jose. Medium potential of impacts from San Jose to downtown Tracy and a low potential in the Central Valley.</p>

**Table 7.2-8**  
**Altamont Pass: San Francisco and San Jose – via San Francisco Peninsula**

<b>Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice</b>	<p>Compatibility: Majority of network alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. It exhibits low compatibility where it does not follow a transportation right-of-way in the Altamont Pass area. It exhibits a medium to high compatibility where it crosses the San Francisco Bay, in Fremont along the more narrow Centerville line, in the Shinn area. It has a medium compatibility in the Lathrop, Manteca, Modesto and Merced areas.</p> <p>Environmental Justice: This network alternative has medium environmental justice impact rating for the Caltrain Corridor and a low environmental justice impact rating for the UPRR alignment from Niles Canyon to the Central Valley. Environmental justice impact is rated as medium in the Central Valley except in the Manteca area, where the impact rating is low.</p> <p>Community: This network alternative would not affect community cohesion, given that the majority of the alignment is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: This network alternative has the potential for high property impacts in the Niles Canyon, Shinn, and Manteca areas, where additional right-of-way would be required.</p>
<b>Aesthetics and Visual Resources:</b> General impacts and rating	<p>Segments visual ratings: (1) Caltrain – San Francisco to Dumbarton =low; (2) Caltrain – Dumbarton to San Jose =low; (3) UPRR =medium; (4) Tracy Downtown =low; (4) Dumbarton High Bridge =medium, and (5) UPRR N/S =low. Overall network alternative rating is low to medium.</p>
<b>Farmlands:</b> <sup>ii</sup> Ac (ha) potentially affected	<p>Farmland: 757.8 ac (306.68 ha)</p> <p>Impact up to 422.7 ac (171.05 ha) of prime farmland. The majority of potential farmland impacts would occur along the Tracy and the UPRR (North/South) segments. Overall, this network alternative would have moderate impacts to farmland within the Altamont Pass network alternatives.</p>
<b>Cultural Resources and Paleontological Resources:</b> <sup>iii</sup> Potential presence of historical resources in area of potential effect	<p>There are 182 known cultural resources.</p> <p>This network alternative extends through numerous historic districts in San Francisco. Historic properties and buildings dating from the 1900s are within the area of potential effects along with railroad facilities, water delivery systems and canals dating from the 1890s, freeway bridges dating from the 1940s, and residential properties dating from the 1880s. The Santa Clara de Asis Mission in San Jose includes both prehistoric and historic resources. Archaeological resources in the area of the Dumbarton crossing include prehistoric sites associated with burials, and historic sites from early 1900s industrial activities. Overall, this network alternative was identified as having a high sensitivity for cultural resources</p>

**Table 7.2-8**  
**Altamont Pass: San Francisco and San Jose – via San Francisco Peninsula**

<p><b>Hydrology and Water Resources:</b><sup>iv</sup>  Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas</p>	<p>Floodplains: 317.3 ac (128.40 ha) direct/ 891.3 ac (360.69 ha) indirect  Streams: 17,481 linear ft (5,328.2 linear m) direct/ 70,714 linear ft (21,553.71 linear m) indirect  Lakes/Waterbodies: 39.6 ac (16.03 ha) direct/ 154.9 ac (62.68 ha) indirect</p> <p>Of the Altamont Pass network alternatives, this network alternative along with four other network alternatives was identified to have the highest area of impact on lakes and the San Francisco Bay due to the Dumbarton crossing. This network alternative was also identified as having the potential to impact the most area of floodplain.</p> <p>Potentially affect San Francisco Bay, San Joaquin River, Stanislaus River, Tuolumne River, Merced River, and Chowchilla River as well as the Hetch Hetchy Aqueduct, South Bay Aqueduct, and California Aqueduct among other water resources. Includes tunnels that would avoid impacts on the floodplain and above ground water resources, and aerial structures that would minimize impact on floodplains and streams, creeks, and channels.</p>
<p><b>Biological Resources Including Wetlands</b> Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas</p>	<p>Wetlands<sup>v</sup>: 44.4 ac (17.97 ha) direct/ 2,264 ac (916.1 ha) indirect  Non-Wetland Waters: 15,947 linear ft (4,860.6 linear m)  Species: 56 special-status plant and 49 special-status wildlife species</p> <p>This alternative could potentially result in impacts on biological resources in San Francisco Bay as a result of the Dumbarton crossing. Potentially significant impacts on special-status plant and wildlife species, wetlands, and waters.</p> <p>Network alternative would be along existing transportation corridors with some portions in new rail corridors. Potentially result in a barrier to the movement of wildlife in areas where it severs wildlife movement corridors. Conflict with conservation and restoration plans and special management areas, such as the Don Edwards San Francisco Bay National Wildlife Refuge. The placement of the alignment and stations and use of tunnels and aerial structures would minimize impacts on biological resources.</p>
<p><b>Fault Crossings</b></p>	<p>San Bruno (Potentially Active) – At Grade  Buried Trace of Unnamed Fault (Potentially Active) – At Grade  Calaveras (Active) – Tunnel  Livermore (Potentially Active) – Above Grade  Greenville (Active) – Above Grade  Vernalis (Active) – At Grade  Buried Trace of Unnamed Fault (Potentially Active) - At Grade  Silver Creek (Potentially Active) - At Grade  Hayward (Active) - Above Grade  Mission (Potentially Active) - At Grade</p>
<p><b>Section 4(f) and 6(f) Resources:</b><sup>4</sup>  Number of resources rated high potential direct effects</p>	<p>There are 30 public parks, recreation lands, wildlife and waterfowl refuges that are 0–150 ft (46 m) from center of the network alternative. Few potential direct impacts are anticipated given that much of the network alternatives is within or directly adjacent to existing transportation rights-of-way, and few resources exist in areas where the network alternative is not adjacent to or within this existing right-of-way. Exceptions include the Augustin-Bernal Park.</p>



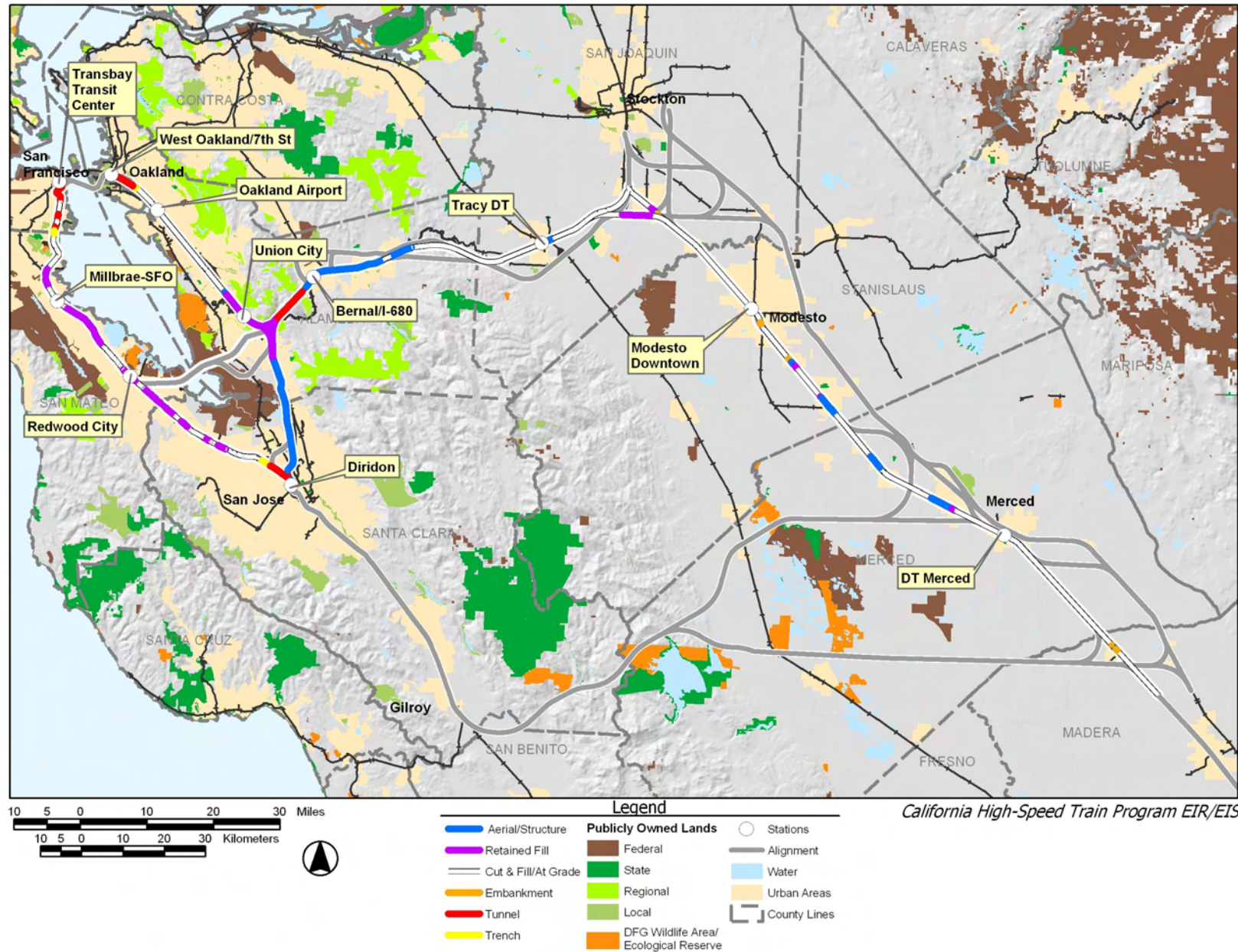
# I. SAN FRANCISCO, SAN JOSE, AND OAKLAND – WITH NO SF BAY CROSSING

This network alternative is shown in Figure 7.2-9 and described in Table 7.2-9. The segments used for this representative alternative are Caltrain Corridor (SF to Dumbarton), Caltrain (Dumbarton to San Jose), Niles/I-880 (West Oakland to Niles Junction), Niles/I-880 (Niles Junction to San Jose via I-880)<sup>12</sup>, East Bay Connectors (Dumbarton/Niles XN & Dumbarton/Niles XS), UPRR (Niles to Altamont), Tracy Downtown (UPRR Connection), and UPRR (Central Valley).

**Table 7.2-9**  
**Altamont Pass: San Francisco, San Jose, and Oakland – with No San Francisco Bay Crossing**

Physical/Operational Characteristics	
<b>Network Alternative Description</b>	This Network alternative would not cross the San Francisco Bay. From San Francisco to San Jose, this network alternative would use the existing Caltrain right-of-way and the Niles/I-880 Alignment south of Niles in the East Bay. The Altamont Pass Alignment would follow the UPRR through downtown Tracy, and the Central Valley would use the UPRR N/S Alignment. Station location options considered for this alternative are Transbay Transit Center, Millbrae/SFO, Redwood City (Caltrain), West Oakland/7 <sup>th</sup> Street, Coliseum/Airport, Union City (BART), San Jose (Diridon), Pleasanton (I-680/Bernal Road), Tracy (Downtown), Modesto (Downtown), and Merced (Downtown).
<b>Length</b>	244.70 mi (393.81 km)
<b>Cost (dollars)</b>	\$14.5 billion
<b>Express Travel Times (minutes)</b>	SF–LA=3:17; Oakland–LA=2:23; SJ–LA=2:19; SF–Sac=1:39; Oakland–Sac=0:53; SJ–Sac=0:49; SF–Fresno=1:54; Oakland–Fresno=1:04; SJ–Fresno=1:01; Livermore–LA=2:06; Tracy–LA=1:59; SF–Tracy=1:32; Oakland–Tracy=0:29; SJ–Tracy=0:25
<b>Ridership</b>	This network alternative would directly serve downtown San Francisco and San Francisco International Airport (SFO), the I-880 Corridor in the East Bay, San Jose, the I-580 corridor and the Central Valley. Ridership and revenue for the statewide HST system with this network alternative is forecast at 85.2 million passengers and \$2.73 billion per year by 2030. Ridership for this network alternative is forecast to be about 3% less than the Altamont “Base Case” network alternative, with revenue about 4% less.
<b>Constructability</b>	Portions of this network alternative are aligned in or along existing passenger rail lines. Maintaining operations on the existing commuter rail service while constructing grade separations, tunnels, elevated sections, and stations would involve major construction issues/challenges. However, the HST infrastructure could be constructed incrementally to minimize impact to existing operations.
<b>O &amp; M Cost (dollars per year)</b>	\$1,123 million
<b>Operational Issues</b>	Average Speed SF–LA=140.2 mph (233.6 kph); Oakland–LA=176.3 mph (293.8 kph); SJ–LA=178.7 mph (297.9 kph); SF–Sac=101.8 mph (169.7 kph); Oakland–Sac=140.1 mph (233.5 kph); SJ–Sac=144.1 mph (240.2 kph); SF–Fresno=112.7 mph (187.9 kph); Oakland–Fresno=162.9 mph (271.6 kph); SJ–Fresno=165 mph (275 kph); Livermore–LA=182.9 mph

<sup>12</sup> Does not include Niles Junction to Niles Wye S (“Niles/I-880 5A”) segment.



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**Figure 7.2-9**  
**Network Alternatives**  
**Altamont Pass**  
**San Francisco, San Jose, and Oakland—no SF Bay Crossing**



**Table 7.2-9**  
**Altamont Pass: San Francisco, San Jose, and Oakland – with No San Francisco Bay Crossing**

	<p>(304.8 kph); Tracy–LA=183.4 mph (305.7 kph); SF–Tracy=63 mph (105 kph); Oakland–Tracy=116.6 mph (194.3 kph) 120.7 mph (201.2 kph)</p> <p>Maximum Speed</p> <p>SF–LA=210 mph (350 kph); Oakland–LA=210 mph (350 kph); SJ–LA=210 mph (350 kph); SF–Sac=198 mph (330 kph); Oakland–Sac=198 mph (330 kph); SJ–Sac=198 mph (330 kph); SF–Fresno=210 mph (350 kph); Oakland–Fresno=210 mph (350 kph); SJ–Fresno=210 mph (350 kph); Livermore–LA=210 mph (350 kph); Tracy–LA=210 mph (350 kph); SF–Tracy=178.2 mph (297kph); Oakland–Tracy=178.2 mph (297 kph); SJ–Tracy=180 mph (300 kph)</p> <p>This network alternative would require the system to split in two separate directions to serve both San Jose and Oakland given a constant number of trains. This decreases the frequency of service from southern California to these stations by a factor of two as compared to network alternatives using the Pacheco Pass alignment options. In addition, travel times to San Francisco are significantly longer than Altamont options using the Dumbarton corridor. Not only do trains travel to San Francisco via San Jose, but the train must be turned in San Jose prior to proceeding north to San Francisco. The turn will take a minimum of 20 minutes.</p> <p>HST operations would need to be coordinated and integrated with Caltrain service in the SF Peninsula and ACE service in the I-580 corridor.</p>
<b>Potential Environmental Impacts</b>	
<b>Travel Conditions</b>	<p>The Caltrain corridor Alignment would bring direct HST service up the San Francisco Peninsula to downtown San Francisco with potential stations in downtown San Francisco, at SFO (Millbrae), and a mid-Peninsula station in Redwood City. The Alternative would serve Oakland, Oakland Airport, Downtown San Jose (Diridon Station), the Tri Valley with a station in Pleasanton (I-680/Bernal Road), Downtown Tracey, and Central Valley stations in Modesto and Merced. This network alternative would increase connectivity and accessibility to San Francisco, the Peninsula and SFO, the hub international airport for northern California, Oakland, the Oakland International Airport (Coliseum/BART), southern Alameda County, San Jose, the I-580 Corridor and Tri-Valley area, and the Central Valley. The HST Network Alternative would provide a safer, more reliable, energy-efficient intercity mode along the San Francisco Peninsula, the East Bay, and the Tri Valley while improving the safety, reliability, and performance of the regional commuter service. The HST Network Alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic. The fully grade-separated Caltrain corridor, Niles/I-880 Alignment between Oakland and Union City would improve local traffic flow and reduce air pollution at existing rail crossings. There would also be some grade separation benefits is the UPRR in the I-580 corridor and UPRR N/S Alignment through the Central Valley. This network alternative does not provide direct service to south Santa Clara County.</p>
<b>Noise and Vibration:</b> <sup>i</sup> High, medium, or low potential impacts	<p>Medium potential of noise impacts for the overall alternative, with a high potential of noise impacts in the Dumbarton Corridor. Medium potential of vibration impacts for the overall alternative. High potential of vibration impacts from Oakland to Niles Junction. Medium potential of vibration impacts, from San Francisco/Niles Junction/San Jose to downtown Tracy and a low potential in the Central Valley.</p>

**Table 7.2-9**  
**Altamont Pass: San Francisco, San Jose, and Oakland – with No San Francisco Bay Crossing**

<b>Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice</b>	<p>Compatibility: Majority of network alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. It exhibits medium compatibility in the Lathrop, Manteca, Modesto and Merced areas.</p> <p>Environmental Justice: This network alternative has medium environmental justice impact rating for the Caltrain Corridor (north of Redwood City) and the east bay from Oakland to San Jose and a low environmental justice impact rating for the UPRR alignment from Niles Canyon to the Central Valley. Environmental justice impact is rated as medium in the Central Valley except in the Manteca area, where the impact rating is low.</p> <p>Community: This network alternative would not affect community cohesion, given that the majority of the alignment is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: This network alternative has the potential for high property impacts in the Niles Canyon and Manteca areas, where additional right-of-way would be required.</p>
<b>Aesthetics and Visual Resources:</b> General impacts and rating.	<p>Segments visual ratings: (1) Caltrain – San Francisco to Dumbarton =low; (2) Caltrain – Dumbarton to San Jose =low; (3) Oakland to Niles Junction =low; (4) Niles Junction to San Jose =medium; (5) UPRR =medium; (6) Tracy Downtown =low; (7) UPRR N/S =low. The overall network alternative rating is low to medium.</p>
<b>Farmlands:</b> <sup>ii</sup> Ac (ha) potentially affected	<p>Farmland: 761.9 ac (308.33 ha)</p> <p>Impact up to 426.8 ac (172.71 ha) of prime farmland. The majority of potential farmland impacts would occur along the Tracy and the UPRR (North/South) segments. Overall, this network alternative would have moderate impacts to farmland within the Altamont Pass network alternatives.</p>
<b>Cultural Resources and Paleontological Resources:</b> <sup>iii</sup> Potential presence of historical resources in area of potential effect	<p>There are 205 known cultural resources.</p> <p>Of the Altamont Pass network alternatives, this network alternative was identified to have the highest number of known resources.</p> <p>This network alternative extends through numerous historic districts in San Francisco. Historic properties and buildings dating from the 1900s are within the area of potential effects along with industrial complexes dating from the 1920s and 1940s, water delivery systems and canals dating from the 1890s, railroad facilities, freeway bridges dating from the 1940s, and residential properties dating from the 1880s. The Santa Clara de Asis Mission in San Jose includes both prehistoric and historic resources. Overall, this network alternative was identified as having a high sensitivity for cultural resources.</p>



**Table 7.2-9**  
**Altamont Pass: San Francisco, San Jose, and Oakland – with No San Francisco Bay Crossing**

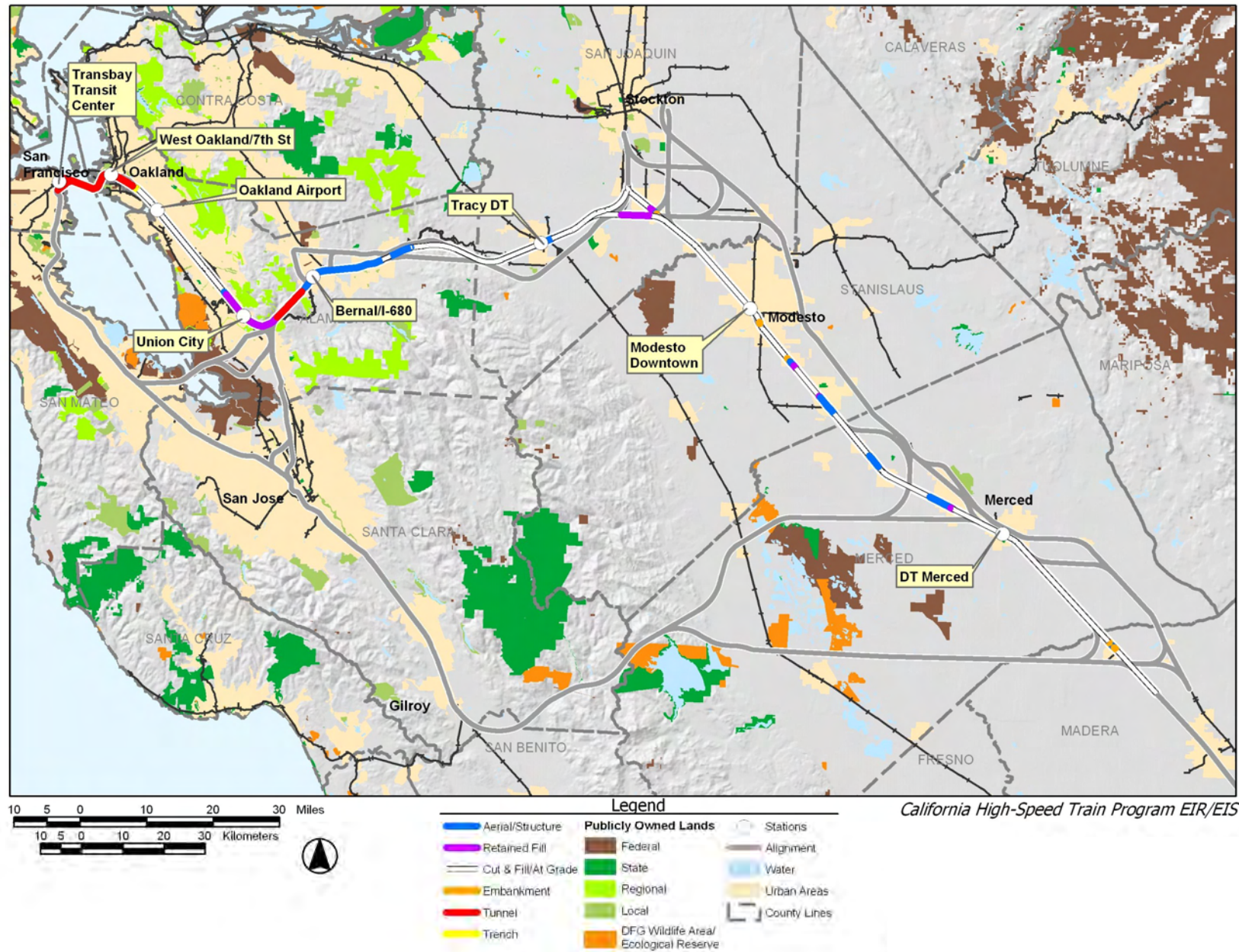
<p><b>Hydrology and Water Resources:</b><sup>iv</sup>  Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.</p>	<p>Floodplains: 314.5 ac (127.27 ha) direct/ 895.8 ac (362.55 ha) indirect  Streams: 20,273 linear ft (6,179.2 linear m) direct/ 82,171 linear ft (25,045.66 linear m) indirect  Lakes/Waterbodies: 2.3 ac (0.93 ha) direct/ 11.0 ac (4.45 ha) indirect</p> <p>Of the Altamont Pass network alternatives, this network alternative was identified to have the highest amount of impact on waters including streams, rivers, and canals. This network alternative would not affect the San Francisco Bay. This network alternative was also identified as having the potential to impact the most impaired waters.</p> <p>Potentially affect Guadalupe River, San Joaquin River, Stanislaus River, Tuolumne River, Merced River, and Chowchilla River as well as the Hetch Hetchy Aqueduct, South Bay Aqueduct, and California Aqueduct among other water resources. Includes tunnels that would avoid impacts on the floodplain and above ground water resources, and aerial structures that would minimize impact on floodplains and streams, creeks, and channels.</p>
<p><b>Biological Resources Including Wetlands</b> Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas</p>	<p>Wetlands<sup>v</sup>: 12.4 ac (5.01 ha) direct/ 957 ac (387.2 ha) indirect  Non-Wetland Waters: 14,622 linear ft (4,115.5 linear m)  Species: 56 special-status plant and 50 special-status wildlife species</p> <p>Of the Altamont Pass network alternatives, this network alternative along with two other network alternatives would have the potential to impact the most special-status wildlife species. Potentially significant impacts to special-status plant and wildlife species, wetlands, and waters.</p> <p>Network alternative would be along existing transportation corridors with some portions in new rail corridors. Potentially result in a barrier to the movement of wildlife in areas where it severs wildlife movement corridors. Conflict with conservation and restoration plans and special management areas. The placement of the alignment and stations and use of tunnels and aerial structures would minimize impacts on biological resources.</p>
<p><b>Fault Crossings</b></p>	<p>San Bruno (Potentially Active) – At Grade  Buried Trace of Unnamed Fault (Potentially Active) – At Grade  Hayward (Active) – At Grade - Adjacent and Parallel  Hayward (Active) – At Grade  Silver Creek (Potentially Active) – Above Grade  Calaveras (Active) – Tunnel  Livermore (Potentially Active) – Above Grade  Greenville (Active) – Above Grade  Vernalis (Active) – At Grade</p>
<p><b>Section 4(f) and 6(f) Resources:</b><sup>4</sup>  Number of resources rated high potential direct effects</p>	<p>There are 39 public parks, recreation lands, wildlife and waterfowl refuges that are 0–150 ft (46 m) from center of the network alternative. Few potential direct impacts are anticipated given that much of the network alternatives is within or directly adjacent to existing transportation rights-of-way, and few resources exist in areas where the network alternative is not adjacent to or within this existing right-of-way. Exceptions include the Augustin-Bernal Park.</p>

## J. OAKLAND AND SAN FRANCISCO – VIA TRANSBAY TUBE

This network alternative is shown in Figure 7.2-10 and described in Table 7.2-10. The segments used for this representative alternative are Trans Bay Crossing – Transbay Transit Center, Niles/I-880 (West Oakland to Niles Junction), East Bay Connector (Dumbarton/Niles XN), UPRR (Niles to Altamont), Tracy UP Connection (Tracy Downtown), and UPRR (Central Valley).

**Table 7.2-10**  
**Altamont Pass: Oakland and San Francisco – via Transbay Tube**

<b>Physical/Operational Characteristics</b>	
<b>Network Alternative Description</b>	From San Francisco to Oakland, this network alternative would use a new transbay tube between San Francisco and Oakland and would use the Niles/I-880 Alignment north of Shinn. The Altamont Pass Alignment would follow the UPRR through downtown Tracy, and the Central Valley would use the UPRR N/S Alignment. Station location options considered for this alternative are Transbay Transit Center, West Oakland/7 <sup>th</sup> Street, Coliseum/Airport, Union City (BART), Pleasanton (I-680/Bernal Road), Tracy (Downtown), Modesto (Downtown), and Merced (Downtown).
<b>Length</b>	179.64 mi (289.11 km)
<b>Cost (dollars)</b>	\$12.9 billion
<b>Express Travel Times (minutes)</b>	SF-LA=2:28; Oakland-LA=2:23; SF-Sac=0:58; Oakland-Sac=0:53; SF-Fresno=1:09; Oakland-Fresno=1:04; Livermore-LA=2:31; Tracy-LA=1:59; SF-Tracy=0:33; Oakland-Tracy=0:29
<b>Ridership</b>	This network alternative would directly serve downtown San Francisco and downtown Oakland, I-580 corridor, and the Central Valley with a single HST line (no split in frequencies) resulting in high ridership and revenue. Total ridership and revenue for the statewide HST system with this network alternative is forecast to be 95.9 million passengers and \$3.16 billion per year by 2030. Ridership for this network alternative is forecast to be about 9% more than the Altamont “Base Case” network alternative, with revenue about 11% more.
<b>Constructability</b>	Constructing a new transbay tube between Oakland and San Francisco would involve major construction activities in the San Francisco Bay. Special construction methods and mitigations would be required. Portions of this network alternative are aligned in or along existing passenger rail lines. Maintaining operations on the existing commuter rail service while constructing grade separations, tunnels, elevated sections, and stations would involve major construction issues/challenges. However, the HST infrastructure could be constructed incrementally to minimize impact to existing operations.
<b>O &amp; M Cost (dollars per year)</b>	\$1,106 million
<b>Operational Issues</b>	<p>Average speed</p> <p>SF-LA=169.6 mph (282.6 kph); Oakland-LA=176.3 mph (293.8 kph); SF-Sac=137.3 mph (228.8 kph); Oakland-Sac=140.1 mph (233.5 kph); SF-Fresno=156.9 mph (261.5 kph); Oakland-Fresno=162.9 mph (271.6 kph); Livermore-LA=182.9 mph (304.8 kph); Tracy-LA=183.4 mph (305.7 kph); SF-Tracy=114.5 mph (190.9 kph); Oakland-Tracy=116.6 mph (194.3 kph)</p> <p>Maximum speed SF-LA=210 mph (350 kph); Oakland-LA=210 mph (350 kph); SF-Sac=198 mph (330 kph); Oakland-Sac=198 mph (330 kph); SF-Fresno=210 mph (350 kph); Oakland-Fresno=210 mph (350 kph); Livermore-LA=210</p>



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**Figure 7.2-10**  
**Network Alternatives**  
**Altamont Pass**  
**Oakland and San Francisco—via Transbay Tube**





**Table 7.2-10**  
**Altamont Pass: Oakland and San Francisco – via Transbay Tube**

	mph (350 kph); Tracy-LA=210 mph (350 kph); SF-Tracy=178.2 mph (297 kph); Oakland-Tracy=178.2 mph (297 kph) HST operations would need to be coordinated and integrated with ACE service in the I-580 corridor.
<b>Potential Environmental Impacts</b>	
<b>Travel Conditions</b>	This network alternative would bring direct HST service to San Francisco and Oakland with stations at the Transbay Transit Center and West Oakland, to the East Bay with a station at the Oakland International Airport (Coliseum/BART) and Union City (BART), with a Tri Valley station in Pleasanton (I-680/Bernal Road), a downtown Tracy Station, and Central Valley stations in Modesto and Merced. This network alternative would increase connectivity and accessibility to San Francisco, Oakland, the Oakland International Airport (Coliseum/BART), southern Alameda County, the I-580 Corridor and Tri-Valley area, and the Central Valley. The HST Network Alternative would provide a safer, more reliable, energy-efficient intercity mode along the I-880 and I-580 corridors while improving the safety, reliability, and performance of the regional commuter service. The HST Network Alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic. The fully grade-separated Niles/I-880 Alignment between Oakland and Union City would improve local traffic flow and reduce air pollution at existing rail crossings. There would also be some grade separation benefits in the UPRR in the I-580 corridor and UPRR N/S Alignment through the Central Valley. This network alternative would not provide direct HST service to SFO, the SF Peninsula/Caltrain Corridor, San Jose, and southern Santa Clara County.
<b>Noise and Vibration:</b> <sup>i</sup> High, medium, or low potential impacts	Medium potential of noise impacts for the overall alternative, with a high potential of noise impacts in the Dumbarton Corridor. Medium potential of vibration impacts for the overall alternative. High potential of vibration impacts from Oakland to Niles Junction. Medium potential of vibration impacts, from San Francisco/Niles Junction to downtown Tracy and a low potential in the Central Valley.
<b>Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice</b>	<p>Compatibility: Majority of network alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. It exhibits low compatibility where it does not follow a transportation right-of-way in the Altamont Pass. It has a medium compatibility in the Lathrop, Manteca, Modesto and Merced areas.</p> <p>Environmental Justice: This network alternative has medium environmental justice impact rating for the East Bay between Niles Junction and Oakland and a low environmental justice impact rating for the UPRR alignment from Niles Canyon to the Central Valley. Environmental justice impact is rated as medium in the Central Valley except in the Manteca area, where the impact rating is low.</p> <p>Community: This network alternative would not affect community cohesion, given that the majority of the alignment is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: This network alternative has the potential for high property impacts in the Niles Canyon and Manteca areas, where additional right-of-way would be required.</p>
<b>Aesthetics and Visual Resources:</b> General impacts and rating.	Segments visual ratings: (1) Oakland to Niles Junction =low; (2) UPRR =medium; (3) Tracy Downtown =low; (4) Trans Bay Crossing =none; and (5) UPRR N/S =low. Overall network alternative rating is low to medium.



**Table 7.2-10**  
**Altamont Pass: Oakland and San Francisco – via Transbay Tube**

<b>Farmlands:</b> <sup>ii</sup> Ac (ha) potentially affected	Farmland: 755.5 ac (305.73 ha)  Impact up to 420.3 ac (170.11 ha) of prime farmland. The majority of potential farmland impacts would occur along the Tracy and the UPRR (North/South) segments. Overall, this network alternative along with the Oakland Terminus and Union City Terminus network alternatives would have the Least Potential Impact to farmland within the Altamont Pass network alternatives.
<b>Cultural Resources and Paleontological Resources:</b> <sup>iii</sup> Potential presence of historical resources in area of potential effect	There are 114 known cultural resources.  Historic properties and industrial complexes dating from the 1920s and 1940s are within the area of potential effects along with water delivery systems and canals dating from the 1890s, freeway bridges dating from the 1940s, and residential properties dating from the 1880s. The area around the Trans Bay crossing likely includes historic artifacts from the Gold Rush period through the 1906 earthquake. Overall, this network alternative was identified as having a low sensitivity for cultural resources.
<b>Hydrology and Water Resources:</b> <sup>iv</sup> Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	Floodplains: 181.1 ac (73.29 ha) direct/ 568.2 ac (229.94 ha) indirect Streams: 16,831 linear ft (5,130.0 linear m) direct/ 73,451 linear ft (22,387.96 linear m) indirect Lakes/Waterbodies: 38.8 ac (15.70 ha) direct/ 243.1 ac (98.38 ha) indirect  Potentially affect San Francisco Bay, San Joaquin River, Stanislaus River, Tuolumne River, Merced River, and Chowchilla River as well as the South Bay Aqueduct and California Aqueduct among other water resources. Includes tunnels that would avoid impacts on the floodplain and above ground water resources, and aerial structures that would minimize impact on floodplains and streams, creeks, and channels.
<b>Biological Resources Including Wetlands</b> Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	Wetlands <sup>v</sup> : 33.6 ac (13.59 ha) direct/ 1,892 ac (765.8 ha) indirect Non-Wetland Waters: 13,502 linear ft (4,115.5 linear m) Species: 40 special-status plant and 43 special-status wildlife species  Of the Altamont Pass network alternatives, this network alternative along with the San Jose, Oakland, and San Francisco – via transbay tube network alternative was identified to have a high impact on wetlands as a result of the Trans Bay crossing. This alternative could also potentially result in significant impacts special-status plant and wildlife species and Bay waters.  Network alternative would be along existing transportation corridors with some portions in new rail corridors. Potentially result in a barrier to the movement of wildlife in areas where it severs wildlife movement corridors. Conflict with conservation and restoration plans and special management areas. The placement of the alignment and stations and use of tunnels and aerial structures would minimize impacts on biological resources.
<b>Fault Crossings</b>	Hayward (Active) – At Grade - Adjacent and Parallel Calaveras (Active) – Tunnel Livermore (Potentially Active) – Above Grade Greenville (Active) – Above Grade Vernalis (Active) – At Grade

**Table 7.2-10**  
**Altamont Pass: Oakland and San Francisco – via Transbay Tube**

<p><b>Section 4(f) and 6(f) Resources:</b><sup>4</sup>                      Number of resources rated high potential direct effects</p>	<p>There are 22 public parks, recreation lands, wildlife and waterfowl refuges that are 0–150 ft (46 m) from center of the network alternative. Few potential direct impacts are anticipated given that much of the network alternatives is within or directly adjacent to existing transportation rights-of-way, and few resources exist in areas where the network alternative is not adjacent to or within this existing right-of-way. Exceptions include the Augustin-Bernal Park.</p>
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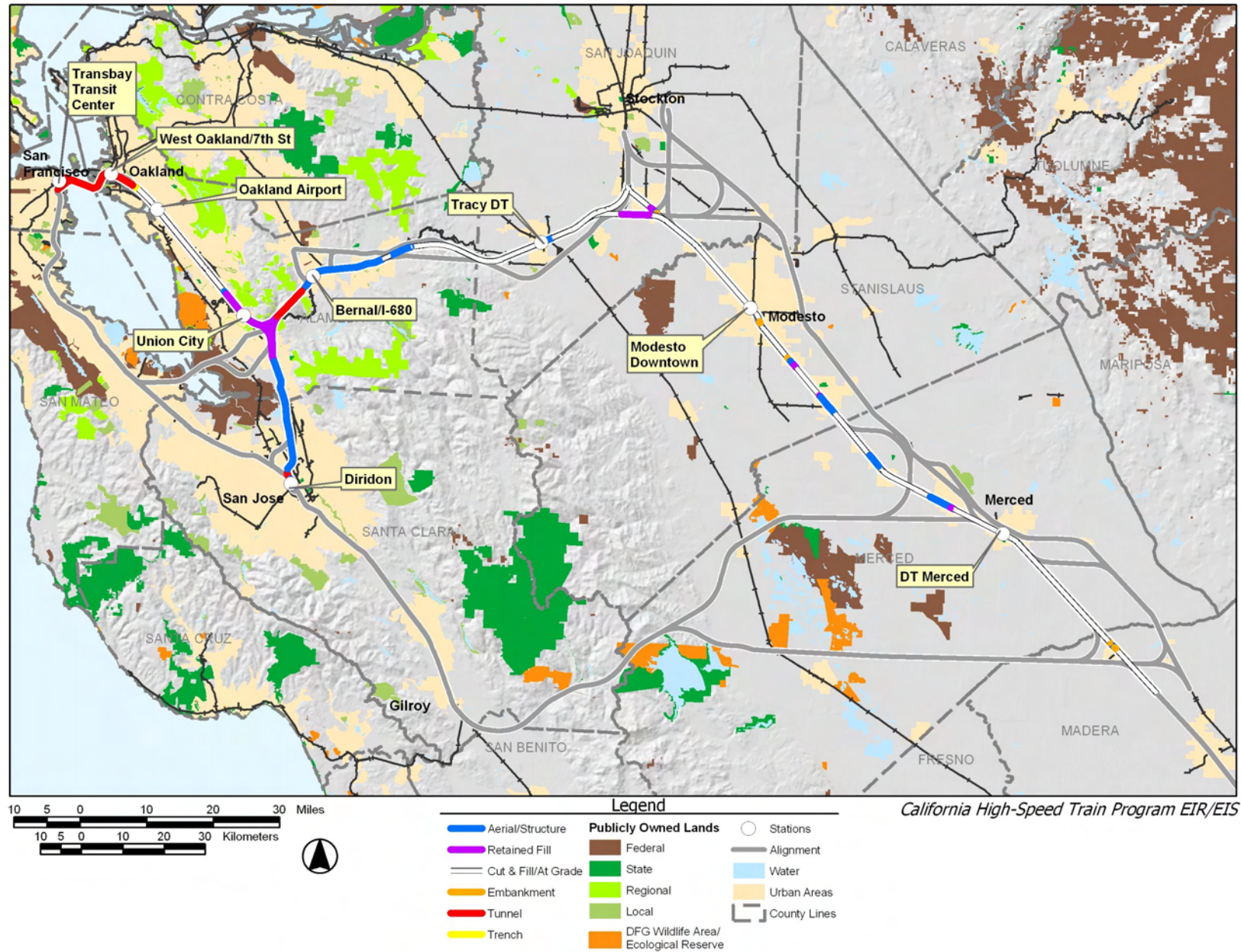
## K. SAN JOSE, OAKLAND, AND SAN FRANCISCO – VIA TRANSBAY TUBE

This network alternative is shown in Figure 7.2-11 and described in Table 7.2-11. The segments used for this representative alternative are Trans Bay Crossing – Transbay Transit Center, Niles/I-880 (West Oakland to Niles Junction), Niles/I-880 (Niles Junction to San Jose via I-880)<sup>13</sup>, UPRR (Niles to Altamont), East Bay Connections (Dumbarton/Niles XN & Dumbarton/Niles XS), Tracy Downtown (UPRR Connection), and UPRR (Central Valley).

**Table 7.2-11**  
**Altamont Pass: San Jose, Oakland, and San Francisco – via Transbay Tube**

<b>Physical/Operational Characteristics</b>	
<b>Network Alternative Description</b>	From San Francisco to Oakland this network alternative would use a new transbay tube. The Niles/I-880 Alignment would be used between Oakland and San Jose, with the UPRR Alignment through the Tri-Valley to Tracy, and the UPRR N/S Alignment through the Central Valley. Station location options considered for this alternative are Transbay Transit Center, West Oakland/7 <sup>th</sup> Street, Coliseum/Airport, Union City (BART), San Jose (Diridon), Pleasanton (I-680/Bernal Road), Tracy (Downtown), Modesto (Downtown), and Merced (Downtown).
<b>Length</b>	199.11 mi (320.44 km)
<b>Cost (dollars)</b>	\$14.8 billion
<b>Express Travel Times (minutes)</b>	SF–LA=2:31; Oakland–LA=2:23; SJ–LA=2:19; SF–Sac=0:58; Oakland–Sac=0:53; SJ–Sac=0:49; SF–Fresno=1:09; SJ–Fresno=1:01; Livermore–LA=2:06; Tracy–LA=1:59; SF–Tracy=0:33; Oakland–Tracy=0:29; SJ–Tracy=1:09
<b>Ridership</b>	This network alternative would directly serve downtown San Francisco and Oakland, San Jose, the I-580 corridor, and the Central Valley and would have high ridership and revenue. Total ridership and revenue for the statewide HST system with this network alternative is forecast to be 89.6 million passengers and \$2.88 billion per year by 2030. Ridership for this network alternative is forecast to be nearly 2% more than the Altamont “Base Case” network alternative, with revenue about 1.4% higher.
<b>Constructability</b>	Constructing a transbay tube between Oakland and San Francisco would involve major construction activities in the San Francisco Bay. Special construction methods and mitigations would be required. Portions of this network alternative are aligned in or along existing passenger rail lines. Maintaining operations on the existing passenger rail service while constructing grade separations, tunnels, elevated sections, and stations would involve major construction issues/challenges. However, the HST infrastructure could be constructed incrementally to minimize impact to existing operations.
<b>O &amp; M Cost (dollars per year)</b>	\$1,093 million
<b>Operational Issues</b>	Average Speed SF–LA=169.6 mph (282.6 kph); Oakland–LA=176.3 mph (293.8 kph); SJ–LA=178.7 mph (297.9 kph); SF–Sac=137.3 mph (228.8 kph); Oakland–Sac=140.1 mph (233.5 kph); SJ–Sac=144.1 mph (240.2 kph); SF–Fresno=156.9 mph (261.5 kph); Oakland–Fresno=162.9 mph (271.6 kph); SJ–Fresno=165 mph (275 kph); Livermore–LA=182.9 mph

<sup>13</sup> Does not include Niles Junction to Niles Wye S (“Niles/I-880 5A”) segment.



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**Figure 7.2-11**  
**Network Alternatives**  
**Altamont Pass**  
**San Jose, Oakland, and San Francisco—via Transbay Tube**





**Table 7.2-11**  
**Altamont Pass: San Jose, Oakland, and San Francisco – via Transbay Tube**

	<p>(304.8 kph); Tracy–LA=183.4 mph (305.7 kph); SF–Tracy=114.5_ mph (190.9 kph); Oakland–Tracy=116.6 mph 194.3 kph); SJ–Tracy=120.7 mph (201.2 kph)</p> <p>Maximum Speed</p> <p>SF–LA=210 mph 350 kph); Oakland–LA=210 mph (350 kph); SJ–LA=210 mph (350 kph); SF–Sac=198 mph (330 kph); Oakland–Sac=198 mph (330 kph); SJ–Sac=198 mph (330 kph); SF–Fresno=210_ mph (350 kph); Oakland–Fresno=210 mph (350 kph); SJ–Fresno=210 mph (350 kph); Livermore–LA=210 mph (350 kph); Tracy–LA=210 mph (350 kph); SF–Tracy=178.2 mph (297 kph); Oakland–Tracy=178.2 mph (297 kph); SJ–Tracy=180 mph (300 kph)</p> <p>This network alternative would require the system to split in two separate directions to serve both San Jose and San Francisco given a constant number of trains. This decreases the frequency of service from southern California to these stations by a factor of two as compared to network alternatives using the Pacheco Pass alignment options. Based on forecasted travel demand, two-thirds of the trains were directed to San Francisco and one-third of the trains were directed to San Jose. HST operations would need to be coordinated and integrated with ACE service in the I-580 corridor.</p>
<b>Potential Environmental Impacts</b>	
<b>Travel Conditions</b>	<p>This network alternative would directly serve downtown San Francisco and Oakland with stations at the Transbay Transit Center and West Oakland, Union City with a station at Union City (BART), San Jose with a Diridon Station, the I-580 corridor with stations in Pleasanton (I-680/Bernal Road), a downtown Tracy Station, and Central Valley stations in Modesto and Merced. This network alternative would increase connectivity and accessibility to San Francisco, Oakland, the Oakland International Airport (Coliseum/BART), southern Alameda County, San Jose, the I-580 Corridor and Tri-Valley area, and the Central Valley. The HST Network Alternative would provide a safer, more reliable, energy-efficient intercity mode along the I-880 and I-580 corridors and in the Central Valley, while improving the safety, reliability, and performance of the regional commuter service. The HST Network Alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic. The fully grade-separated Niles/I-880 Alignment between Oakland and Union City would improve local traffic flow and reduce air pollution at existing rail crossings. There would also be some grade separation benefits in the UPRR in the I-580 corridor and UPRR N/S Alignment through the Central Valley. This network alternative would not provide direct HST service to SFO, the mid-SF Peninsula area, and south Santa Clara County.</p>
<b>Noise and Vibration:</b> <sup>1</sup> High, medium, or low potential impacts	<p>Medium potential of noise impacts for the overall alternative, with a high potential of noise impacts in the Dumbarton Corridor. Medium potential of vibration impacts for the overall alternative. High potential of vibration impacts from Oakland to Niles Junction. Medium potential of vibration impacts, from San Francisco/Niles Junction/San Jose to downtown Tracy and a low potential in the Central Valley.</p>
<b>Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice</b>	<p>Compatibility: Majority of network alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. It exhibits low compatibility where it does not follow a transportation right-of-way in the Altamont Pass. It has a medium compatibility in the Lathrop, Manteca, Modesto and Merced areas.</p> <p>Environmental Justice: This network alternative has medium environmental justice impact rating for the East Bay between Oakland and San Jose and a low environmental justice impact rating for the UPRR alignment from Niles</p>

**Table 7.2-11**  
**Altamont Pass: San Jose, Oakland, and San Francisco – via Transbay Tube**

	<p>Canyon to the Central Valley. Environmental justice impact is rated as medium in the Central Valley except in the Manteca area, where the impact rating is low.</p> <p>Community: This network alternative would not affect community cohesion, given that the majority of the alignment is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: This network alternative has the potential for high property impacts in the Niles Canyon and Manteca areas, where additional right-of-way would be required.</p>
<b>Aesthetics and Visual Resources:</b> General impacts and rating.	Segments visual ratings: (1) Oakland to Niles Junction =low; (2) Niles Junction to San Jose =medium; (3) UPRR =medium; (4) Tracy Downtown =low, (5) Trans Bay Crossing =none, and (6) UPRR N/S =low. Overall network alternative rating is low to medium.
<b>Farmlands:</b> <sup>ii</sup> Ac (ha) potentially affected	<p>Farmland: 761.9 ac (308.33 ha)</p> <p>Impact up to 426.8 ac (172.71 ha) of prime farmland. The majority of potential farmland impacts would occur along the Tracy and the UPRR (North/South) segments. Overall, this network alternative would have moderate impacts to farmland within the Altamont Pass network alternatives.</p>
<b>Cultural Resources and Paleontological Resources:</b> <sup>iii</sup> Potential presence of historical resources in area of potential effect	<p>There are 119 known cultural resources.</p> <p>Historic properties and industrial complexes dating from the 1920s and 1940s are within the area of potential effects along with water delivery systems and canals dating from the 1890s, freeway bridges dating from the 1940s, and residential properties dating from the 1880s. The area around the Trans Bay crossing likely includes historic artifacts from the Gold Rush period through the 1906 earthquake. Overall, this network alternative was identified as having a moderate sensitivity for cultural resources.</p>
<b>Hydrology and Water Resources:</b> <sup>iv</sup> Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	<p>Floodplains: 218.6 ac (88.48 ha) direct/ 720.4 ac (291.56 ha) indirect</p> <p>Streams: 17,660 linear ft (5,382.7 linear m) direct/ 76,905 linear ft (23,440.49 linear m) indirect</p> <p>Lakes/Waterbodies: 38.8 ac (15.70 ha) direct/ 243.1 ac (98.38 ha) indirect</p> <p>Potentially affect San Francisco Bay, Guadalupe River, San Joaquin River, Stanislaus River, Tuolumne River, Merced River, and Chowchilla River as well as the Hetch Hetchy Aqueduct, South Bay Aqueduct, and California Aqueduct among other water resources. Includes tunnels that would avoid impacts on the floodplain and above ground water resources, and aerial structures that would minimize impact on floodplains and streams, creeks, and channels.</p>

**Table 7.2-11**  
**Altamont Pass: San Jose, Oakland, and San Francisco – via Transbay Tube**

<b>Biological Resources Including Wetlands</b> Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	<p>Wetlands<sup>v</sup>: 35.1 ac (14.21 ha) direct/ 2,158 ac (873.5 ha) indirect</p> <p>Non-Wetland Waters: 14,032 linear ft (4,227.0 linear m)</p> <p>Species: 42 special-status plant and 43 special-status wildlife species</p> <p>This alternative could potentially result in significant impacts on biological resources in San Francisco Bay as a result of the Trans Bay crossing, including wetlands, special-status plant and wildlife species, and Bay waters.</p> <p>Network alternative would be along existing transportation corridors with some portions in new rail corridors. Potentially result in a barrier to the movement of wildlife in areas where it severs wildlife movement corridors. Conflict with conservation and restoration plans and special management areas. The placement of the alignment and stations and use of tunnels and aerial structures would minimize impacts on biological resources.</p>
<b>Fault Crossings</b>	<p>Hayward (Active) – At Grade - Adjacent and Parallel</p> <p>Hayward (Active) – At Grade</p> <p>Silver Creek (Potentially Active) – Above Grade</p> <p>Calaveras (Active) – Tunnel</p> <p>Livermore (Potentially Active) – Above Grade</p> <p>Greenville (Active) – Above Grade</p> <p>Vernalis (Active) – At Grade</p>
<b>Section 4(f) and 6(f) Resources:</b> <sup>4</sup> Number of resources rated high potential direct effects	<p>There are 30 public parks, recreation lands, wildlife and waterfowl refuges that are 0–150 ft (46 m) from center of the network alternative. Few potential direct impacts are anticipated given that much of the network alternatives is within or directly adjacent to existing transportation rights-of-way, and few resources exist in areas where the network alternative is not adjacent to or within this existing right-of-way. Exceptions include the Augustin-Bernal Park.</p>

## 7.2.2 Pacheco Pass Alternatives

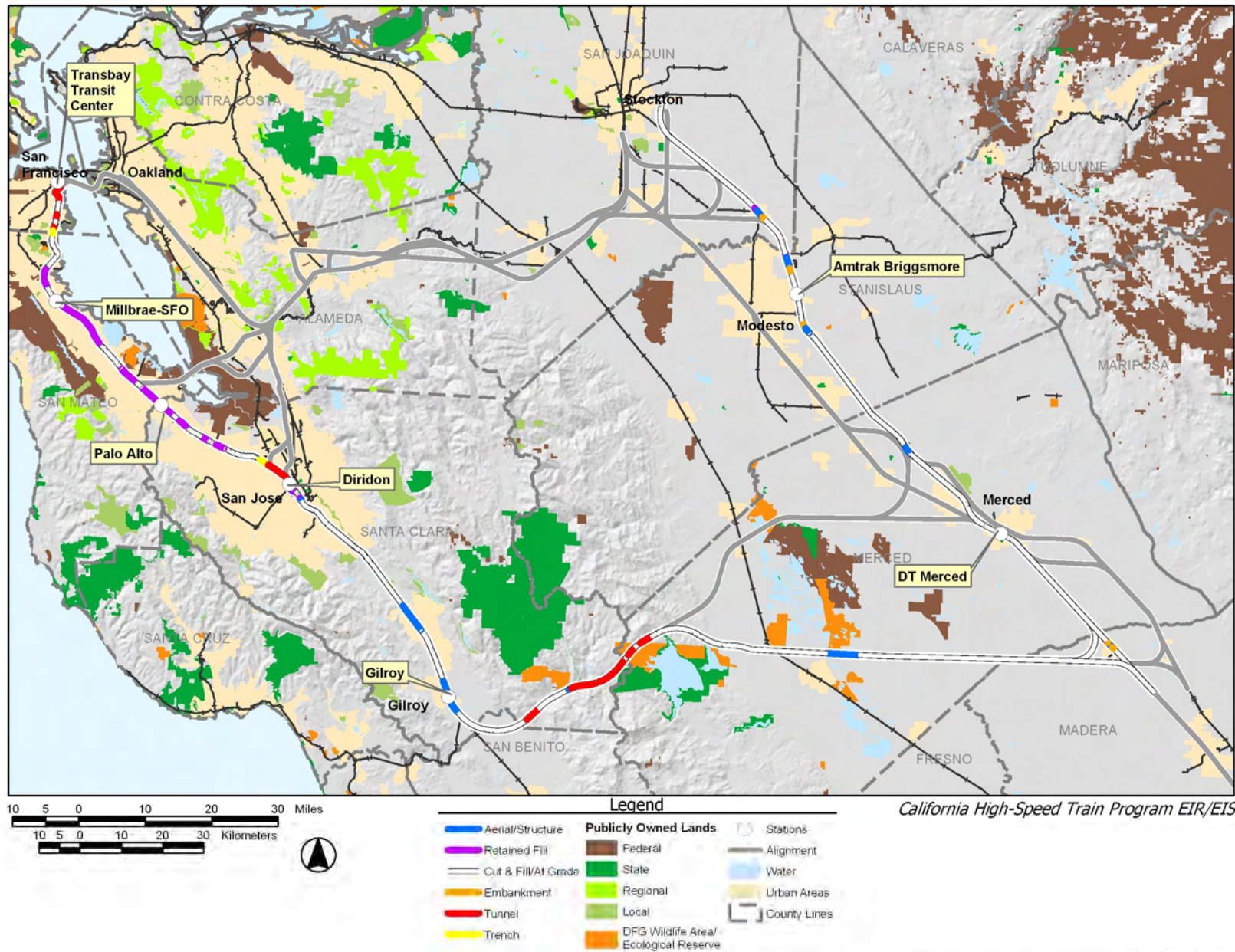
### A. SAN FRANCISCO AND SAN JOSE TERMINI

This network alternative is shown in Figure 7.2-12 and described in Table 7.2-12. The segments used for this representative alternative are Caltrain Corridor (SF to Dumbarton), Caltrain (Dumbarton to San Jose), Pacheco (San Jose to Western Valley), Henry Miller (Western Valley to BNSF/UPRR), Henry Miller UPRR Connection, BNSF-UPRR.

**Table 7.2-12**  
**Pacheco Pass: San Francisco and San Jose Termini (Base Case for Pacheco)**

Physical/Operational Characteristics	
<b>Network Alternative Description</b>	From San Francisco to San Jose, this network alternative would use the existing Caltrain rail right-of-way. The Pacheco and Henry Miller (to the UPRR) Alternatives would be used between San Jose and the Central Valley. The BNSF N/S (north of Merced) and UPRR N/S (south of Merced) Alignments would be used in the Central Valley. Station location options considered for this alternative are Transbay Transit Center, Millbrae/SFO, Redwood City, San Jose (Diridon), Gilroy (Caltrain), Merced (Downtown), and Briggsmore (Amtrak).
<b>Length</b>	267.53 mi (430.55 km)
<b>Cost (dollars)</b>	\$12.4 billion
<b>Express Travel Times (minutes)</b>	SF–LA=2:38; SJ–LA=2:09; SF–Sac=1:47; SJ–Sac=1:18; SF–Fresno=1:20; SJ–Fresno=0:51; Gilroy–LA=1:57; SF–Gilroy=0:44; SJ–Gilroy=0:15
<b>Ridership</b>	This network alternative would directly serve downtown San Francisco and San Francisco International Airport (SFO), San Jose, southern Santa Clara County, and the Central Valley and would have high ridership and revenue potential. Total ridership and revenue for the statewide HST system with this network alternative is forecast to be 93.9 million passengers and \$3.1 billion per year by 2030.
<b>Constructability</b>	Portions of this network alternative are aligned in or along existing passenger rail lines. Maintaining operations on the existing passenger rail service while constructing grade separations, tunnels, elevated sections, and stations would involve major construction issues/challenges. However, the HST infrastructure could be constructed incrementally to minimize impact to existing operations.
<b>O &amp; M Cost (dollars per year)</b>	\$1,182 million
<b>Operational Issues</b>	<p>Average Speed</p> <p>SF–LA=164.2 mph (273.6 kph); SJ–LA=179.5 mph (299.2 kph); SF–Sac=152.8 mph (254.7 kph); SJ–Sac=174 mph (290 kph); SF–Fresno=139.5 mph (232.5 kph); SJ–Fresno=164.3 mph (273.8 kph); Gilroy–LA=183.2 mph (305.4 kph); SF–Gilroy=102.3 mph (170.6 kph); SJ–Gilroy=114.6 mph (191 kph)</p> <p>Maximum Speed</p> <p>SF–LA=210 mph (350 kph); SJ–LA=210 mph (350 kph); SF–Sac=210 mph (350 kph); SJ–Sac=210 mph (350 kph); SF–Fresno=210 mph (350 kph); SJ–Fresno=210 mph (350 kph); Gilroy–LA=210 mph (350 kph); SF–Gilroy=180 mph (300 kph); SJ–Gilroy=180 mph (300 kph)</p>





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**Figure 7.2-12**  
**Network Alternatives**  
**Pacheco Pass**  
**San Francisco and San Jose Termini**





**Table 7.2-12**  
**Pacheco Pass: San Francisco and San Jose Termini (Base Case for Pacheco)**

	HST operations would need to be coordinated and integrated with Caltrain service.
<b>Potential Environmental Impacts</b>	
<b>Travel Conditions</b>	The Caltrain corridor Alignment would bring direct HST service up the San Francisco Peninsula to downtown San Francisco with potential stations in downtown San Francisco, at SFO (Millbrae), and a mid-Peninsula station at either Redwood City. The network alternative would serve Southern Santa Clara County with a Station in Gilroy, and the Central Valley, with station in Merced and Briggsmore. This network alternative would increase connectivity and accessibility to San Francisco, the Peninsula and SFO, the hub international airport for northern California, San Jose, Southern Santa Clara County and the Monterey/Santa Cruz/Salinas area, and the Central Valley. The Gilroy station would be the closest HST station for Monterey, Santa Cruz, and San Benito counties. The HST Network Alternative would provide a safer, more reliable, energy-efficient intercity mode along the San Francisco Peninsula while improving the safety, reliability, and performance of the regional commuter service. The HST Network Alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic. The fully grade-separated Caltrain corridor north of Gilroy would improve local traffic flow and reduce air pollution at existing rail crossings. There would also be some grade separation benefits in the BNSF N/S (north of Merced) and UPRR N/S (south of Merced) in the Central Valley. This network alternative would not provide direct HST service to Oakland, Oakland Airport, the East Bay, south Alameda County, and the I-580 corridor.
<b>Noise and Vibration:</b> <sup>1</sup> High, medium, or low potential impacts	Medium potential of noise impacts for the overall alternative. All segments have a medium potential for noise impacts, with the expectation of Henry Miller and Henry Miller UPRR Connection, which have a low potential of noise impacts. Medium potential of vibration impacts for the overall alternative. Medium potential of vibration impacts from San Francisco to Dumbarton. High potential of vibration impacts from Dumbarton to San Jose. Medium potential of vibration impacts, from San Jose to Gilroy and a low potential in the Central Valley.
<b>Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice</b>	<p>Compatibility: Majority of network alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way for most of the alignment. It exhibits low compatibility where it connects to the UPRR N/S or BNSF N/S in the Chowchilla area and a medium compatibility along the BNSF N/S Alignment in the Central Valley.</p> <p>Environmental Justice: This network alternative has medium environmental justice impact rating for the Caltrain Corridor between San Francisco and Gilroy and a low impact rating from Gilroy to the Central Valley. The BNSF N/S alignment has a medium impact rating except for low impact ratings in the Briggsmore and Chowchilla areas.</p> <p>Community: This network alternative would not affect community cohesion, given that the majority of the alignment is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: This network alternative has the potential for low property impacts as the alignment either traverses existing transportation right-of-way or through rural land. This network alternative</p>
<b>Aesthetics and Visual Resources:</b> General impacts and rating.	Segments visual ratings: (1) Caltrain – San Francisco to Dumbarton =low; (2) Caltrain – Dumbarton to San Jose =low; (3) Pacheco =medium; (4) Henry Miller to UPRR =low, and (5) BNSF N/S =low. Overall network alternative rating is low to medium.

**Table 7.2-12**  
**Pacheco Pass: San Francisco and San Jose Termini (Base Case for Pacheco)**

<b>Farmlands:</b> <sup>ii</sup> Ac (ha) potentially affected	Farmland: 1,372.3 ac (555.36ha)  Impact up to 663.3 ac (268.45 ha) of prime farmland. The majority of potential farmland impacts would occur along the Pacheco, Henry Miller, BNSF (North/South), and UPRR (North/South) segments. Overall, this network alternative along with the San Jose Terminus and San Jose, San Francisco, and Oakland via transbay tube would have the Least Potential Impacts (LPI) to farmland within the Pacheco Pass network alternatives.
<b>Cultural Resources and Paleontological Resources:</b> <sup>iii</sup> Potential presence of historical resources in area of potential effect	There are 167 known cultural resources.  This network alternative extends through numerous historic districts in San Francisco. Historic properties and buildings dating from the 1900s are within the area of potential effects along with water delivery systems and canals dating from the 1890s, a sanitary sewer system from 1912, railroad facilities, freeway bridges dating from the 1940s, and residential properties dating from the 1880s. The Santa Clara de Asis Mission in San Jose includes both prehistoric and historic resources. Overall, this network alternative was identified as having a moderate sensitivity for cultural resources.
<b>Hydrology and Water Resources:</b> <sup>iv</sup> Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	Floodplains: 520.8 ac (210.76 ha) direct/ 1633.2 ac (660.96 ha) indirect Streams: 20,276 linear ft (6,180.1 linear m) direct/ 90,572 linear ft (27,606.42 linear m) indirect Lakes/Waterbodies: 3.8 ac (1.55 ha) direct/ 19.7 ac (7.97 ha) indirect  Of the Pacheco Pass network alternatives, this network alternative along with one other network alternative was identified to have the least amount of impact on lakes and would not impact San Francisco Bay.  Potentially affect Guadalupe River, Pajaro River, San Joaquin River, Stanislaus River, Tuolumne River, Merced River, and Chowchilla River as well as the Hetch Hetchy Aqueduct and California Aqueduct among other water resources. Several watercourses would be crossed more than once. Includes tunnels that would avoid impacts on the floodplain and above ground water resources, and aerial structures that would minimize impact on floodplains and streams, creeks, and channels.
<b>Biological Resources Including Wetlands</b> Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	Wetlands <sup>v</sup> : 15.6 ac (6.30 ha) direct/ 1,601 ac (648.1 ha) indirect Non-Wetland Waters: 14,395 linear ft (4,387.5 linear m) Species: 58 special-status plant and 53 special-status wildlife species  Of the Pacheco Pass network alternatives, this network alternative along with two other network alternatives would have the potential to impact the most special-status wildlife species, but the least area of impact on wetlands. Potentially significant impacts to special-status plant and wildlife species, wetlands, and waters.  Network alternative would be along existing transportation corridors with some portions in new rail corridors. Potentially result in a barrier to the movement of wildlife in areas where it severs wildlife movement corridors. Conflict with conservation and restoration plans and special management areas, such as the GEA. The placement of the alignment and stations and use of tunnels and aerial structures would minimize impacts on biological resources.

**Table 7.2-12**  
**Pacheco Pass: San Francisco and San Jose Termini (Base Case for Pacheco)**

<b>Fault Crossings</b>	<p>San Bruno (Potentially Active) – At Grade</p> <p>Buried Trace of Unnamed Fault (Potentially Active) – At Grade</p> <p>Silver Creek (Potentially Active) – At Grade</p> <p>Calaveras (Active) – At Grade</p> <p>Ortigalita (Active) – At Grade</p>
<p><b>Section 4(f) and 6(f) Resources:</b><sup>4</sup></p> <p>Number of resources rated high potential direct effects</p>	<p>There are 18 public parks, recreation lands, wildlife and waterfowl refuges that are 0–150 ft (46 m) from center of the network alternative. Few potential direct impacts are anticipated given that much of the network alternatives is within or directly adjacent to existing transportation rights-of-way, and few resources exist in areas where the network alternative is not adjacent to or within this existing right-of-way.</p>

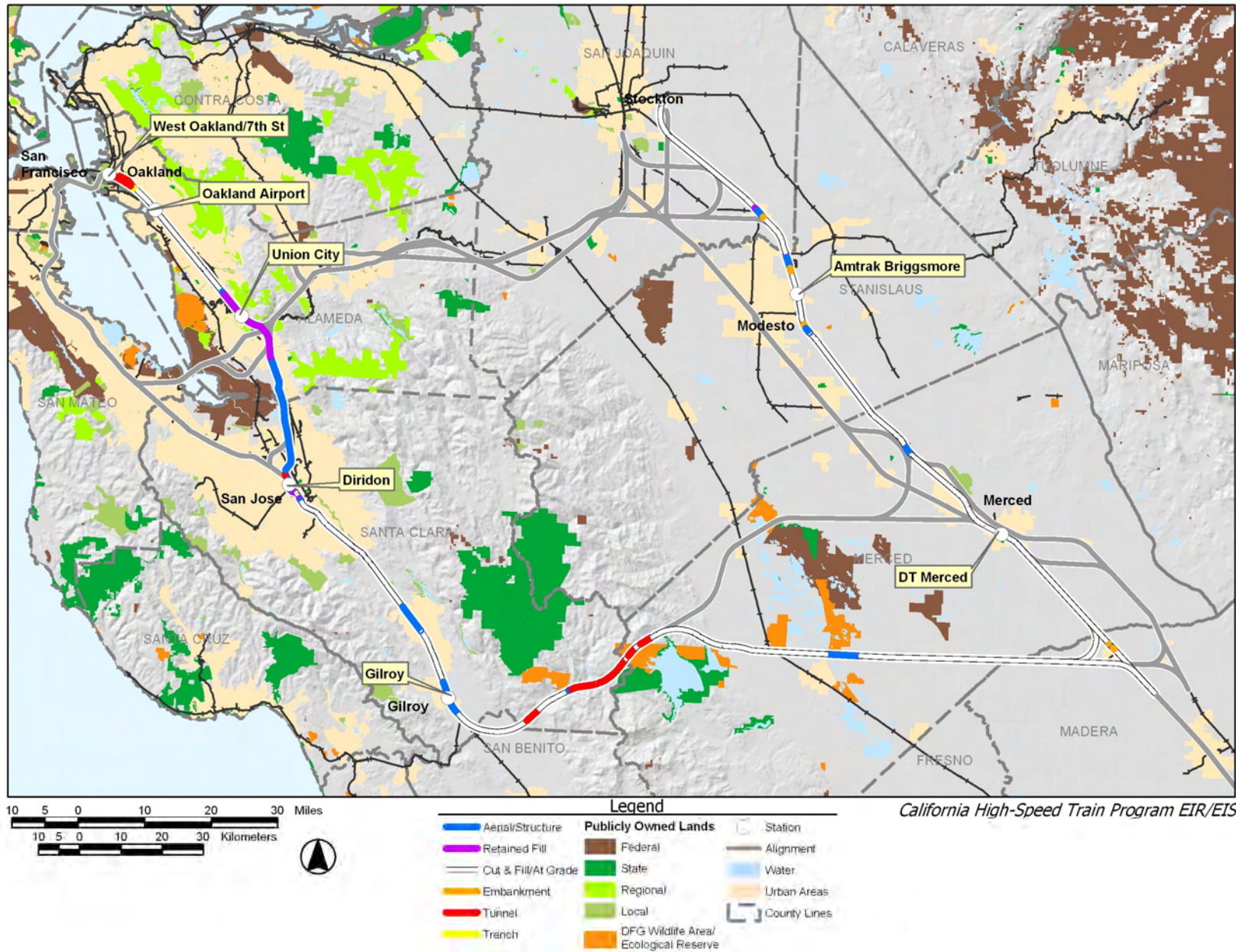
## B. OAKLAND AND SAN JOSE TERMINI

This network alternative is shown in Figure 7.2-13 and described in Table 7.2-13. The segments used for this representative alternative are Niles/I-880 (West Oakland to Niles Junction), Niles/I-880 (Niles Junction to San Jose via I-880), Pacheco (San Jose to Western Valley), Henry Miller (Western Valley to BNSF/UPRR), Henry Miller UPRR Connection, BNSF - UPRR.

**Table 7.2-13**  
**Pacheco Pass: Oakland and San Jose Termini**

<b>Physical/Operational Characteristics</b>	
<b>Network Alternative Description</b>	From Oakland to San Jose, this network alternative would use the Niles/I-880 Alignment. The Pacheco and Henry Miller (to the UPRR) Alternatives would be used between San Jose and the Central Valley. The BNSF N/S (north of Merced) and UPRR N/S (south of Merced) Alignments would be used in the Central Valley. Station location options considered for this alternative are West Oakland/7 <sup>th</sup> Street, Coliseum/Airport, Union City (BART), San Jose (Diridon), Gilroy (Caltrain), Merced (Downtown), and Briggsmore (Amtrak).
<b>Length</b>	256.87 mi (413.40 km)
<b>Cost (dollars)</b>	\$11.6 billion
<b>Express Travel Times (minutes)</b>	Oakland-LA=2:30; SJ-LA=2:09; Oakland-Sac=1:38; SJ-Sac=1:18; Oakland-Fresno=1:12; SJ-Fresno=0:51; Gilroy-LA=1:57; Oakland-Gilroy=0:36; SJ-Gilroy=0:15
<b>Ridership</b>	This network alternative would directly serve downtown Oakland and Oakland International Airport (Oakland Coliseum/BART Station) San Jose, southern Santa Clara County, and the Central Valley and would have high ridership and revenue potential. Total ridership is forecast to be about 2% less than the Pacheco "Base Case" forecasts. For the low end forecasts, this would result in about 91.7 million passengers a year by 2030. Revenue for the statewide HST system with this network alternative is \$3.08 billion per year by 2030.
<b>Constructability</b>	Portions of this network alternative are aligned in or along existing passenger rail lines and highways. Maintaining operations on the existing commuter rail service and automobile traffic while constructing grade separations, tunnels, elevated sections, and stations would involve major construction issues/challenges. However, the HST infrastructure could be constructed incrementally to minimize impact to existing operations.
<b>O &amp; M Cost (dollars per year)</b>	\$1,166 million
<b>Operational Issues</b>	<p>Average Speed</p> <p>Oakland-LA=170.7 mph (284.6 kph); SJ-LA=179.5 mph (299.2 kph); Oakland-Sac=163.5 mph (272.6 kph); SJ-Sac=174 mph (290 kph); Oakland-Fresno=150.5 mph (250.8kph); SJ-Fresno=164.3 mph (273.8 kph); Gilroy-LA=183.2 mph (305.4 kph); Oakland-Gilroy=116 mph (193.3 kph); SJ-Gilroy=114.6 mph (191 kph)</p> <p>Maximum Speed</p> <p>Oakland-LA=210 mph (350 kph); SJ-LA=210 mph (350 kph); Oakland-Sac=210 mph (350 kph); SJ-Sac=210_ mph (350 kph); Oakland-Fresno=210 mph (350 kph); SJ-Fresno=210 mph (350 kph); Gilroy-LA=210 mph (350 kph); Oakland-Gilroy=180 mph (300 kph); SJ-Gilroy=180 mph (300 kph)</p> <p>HST operations would need to be coordinated and integrated with Caltrain service between San Jose and Gilroy.</p>





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Figure 7.2-13  
Network Alternatives  
Pacheco Pass  
Oakland and San Jose Termini



**Table 7.2-13  
Pacheco Pass: Oakland and San Jose Termini**

<b>Potential Environmental Impacts</b>	
<b>Travel Conditions</b>	The Niles/I-880 corridor Alignment would bring direct HST service up the Oakland, the East Bay, and San Jose with stations in West Oakland, at the Oakland International Airport (Coliseum/BART), Union City (BART) and the Diridon Station in San Jose. The network alternative would serve southern Santa Clara County at Gilroy and the Central Valley with stations in Merced and Briggsmore. This network alternative would increase connectivity and accessibility to Oakland, the Oakland International Airport (Coliseum/BART), southern Alameda County, San Jose, Southern Santa Clara County and Monterey/ Santa Cruz/ Salinas area, and the Central Valley. The Gilroy station would be the closest HST station for Monterey, Santa Cruz, and San Benito counties. The HST Network Alternative would provide a safer, more reliable, energy-efficient intercity mode along the East Bay while improving the safety, reliability, and performance of the regional commuter service. The HST Network Alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic. The fully grade-separated Niles/I-880 Alignment between Oakland and Union City would improve local traffic flow and reduce air pollution at existing rail crossings. There would also be some grade separation benefits in the BNSF N/S (north of Merced) and UPRR N/S (south of Merced) in the Central Valley. This network alternative would not provide direct HST service to San Francisco, SFO, the SF Peninsula/Caltrain Corridor, and the I-580 corridor (Tri-Valley and Tracy).
<b>Noise and Vibration:</b> <sup>1</sup> High, medium, or low potential impacts	Medium potential of noise impacts for the overall alternative. All segments have a medium potential for noise impacts, with the expectation of Henry Miller and Henry Miller UPRR Connection, which have a low potential of noise impacts. Medium to high potential of vibration impacts for the overall alternative. High potential of vibration impacts from Oakland to San Jose. Medium potential of vibration impacts, from San Jose to Gilroy and a low potential in the Central Valley.
<b>Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice</b>	<p>Compatibility: Majority of network alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way for most of the alignment. It exhibits low compatibility where it connects to the UPRR N/S or BNSF N/S in the Chowchilla area and a medium compatibility along the BNSF N/S Alignment in the Central Valley.</p> <p>Environmental Justice: This network alternative has medium environmental justice impact rating for the East Bay between Oakland and San Jose, and a medium impact rating for the Caltrain Corridor between San Jose and Gilroy. It has a low impact rating from Gilroy to the Central Valley. The BNSF N/S alignment has a medium impact rating except for low impact ratings in the Briggsmore and Chowchilla areas.</p> <p>Community: This network alternative would not affect community cohesion, given that the majority of the alignment is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: This network alternative has the potential for low property impacts as the alignment either traverses existing transportation right-of-way or through rural land. This network alternative</p>
<b>Aesthetics and Visual Resources:</b> General impacts and rating.	Segments visual ratings: (1) Oakland to Niles Junction =low; (2) Niles Junction to San Jose =medium; (3) Pacheco =medium; (4) Henry Miller to UPRR =low; and (5) BNSF N/S =low. Overall network alternative rating is low to medium.

**Table 7.2-13**  
**Pacheco Pass: Oakland and San Jose Termini**

<b>Farmlands:</b> <sup>ii</sup> Ac (ha) potentially affected	Farmland: 1,378.7 ac (557.96 ha)  Impact up to 669.7 ac (271.04 ha) of prime farmland. The majority of potential farmland impacts would occur along the Pacheco, Henry Miller, BNSF (North/South), and UPRR (North/South) segments. Overall, this network alternative along with the San Francisco, Oakland, and San Jose Termini and San Jose, Oakland, and San Francisco via transbay tube would have the greatest potential impact on farmland within the Pacheco Pass network alternatives. The difference in overall farmland impacts within the Pacheco Pass network alternatives is less than 6.4 ac (2.59 ha).
<b>Cultural Resources and Paleontological Resources:</b> <sup>iii</sup> Potential presence of historical resources in area of potential effect	There are 106 known cultural resources.  Historic properties and buildings dating from the 1900s and industrial complexes from the 1920s are within the area of potential effects along with water delivery systems and canals dating from the 1890s, a sanitary sewer system, railroad facilities, freeway bridges dating from the 1940s, and residential properties dating from the 1880s. Overall, this network alternative was identified as having a low sensitivity for cultural resources.
<b>Hydrology and Water Resources:</b> <sup>iv</sup> Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	Floodplains: 477.5 ac (193.24 ha) direct/ 1638.5 ac (663.09 ha) indirect Streams: 21,788 linear ft (6,640.9 linear m) direct/ 99,406 linear ft (30,298.89 linear m) indirect Lakes/Waterbodies: 4.5 ac (1.81 ha) direct/ 17.6 ac (7.13 ha) indirect  Potentially affect Guadalupe River, Pajaro River, San Joaquin River, Stanislaus River, Tuolumne River, Merced River, and Chowchilla River as well as the Hetch Hetchy Aqueduct and California Aqueduct among other water resources. Several watercourses would be crossed more than once. Includes tunnels that would avoid impacts on the floodplain and above ground water resources, and aerial structures that would minimize impact on floodplains and streams, creeks, and channels.
<b>Biological Resources Including Wetlands</b> Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	Wetlands <sup>v</sup> : 17.4 ac (7.04 ha) direct/ 1,825 ac (738.7 ha) indirect Non-Wetland Waters: 14,533 linear ft (4,429.6 linear m) Species: 49 special-status plant and 49 special-status wildlife species  This network alternative could potentially result in significant impacts to special-status plant and wildlife species, wetlands, and waters.  Network alternative would be along existing transportation corridors with some portions in new rail corridors. Potentially result in a barrier to the movement of wildlife in areas where it severs wildlife movement corridors. Conflict with conservation and restoration plans and special management areas, such as the GEA. The placement of the alignment and stations and use of tunnels and aerial structures would minimize impacts on biological resources.
<b>Fault Crossings</b>	Hayward (Active) – At Grade - Adjacent and Parallel Hayward (Active) – At Grade Silver Creek (Potentially Active) – Above Grade Silver Creek (Potentially Active) – At Grade Calaveras (Active) – At Grade Ortinglita (Active) – At Grade

**Table 7.2-13**  
**Pacheco Pass: Oakland and San Jose Termini**

<p><b>Section 4(f) and 6(f) Resources:</b><sup>4</sup> Number of resources rated high potential direct effects</p>	<p>There are 21 public parks, recreation lands, wildlife and waterfowl refuges that are 0–150 ft (46 m) from center of the network alternative. Few potential direct impacts are anticipated given that much of the network alternatives is within or directly adjacent to existing transportation rights-of-way, and few resources exist in areas where the network alternative is not adjacent to or within this existing right-of-way.</p>
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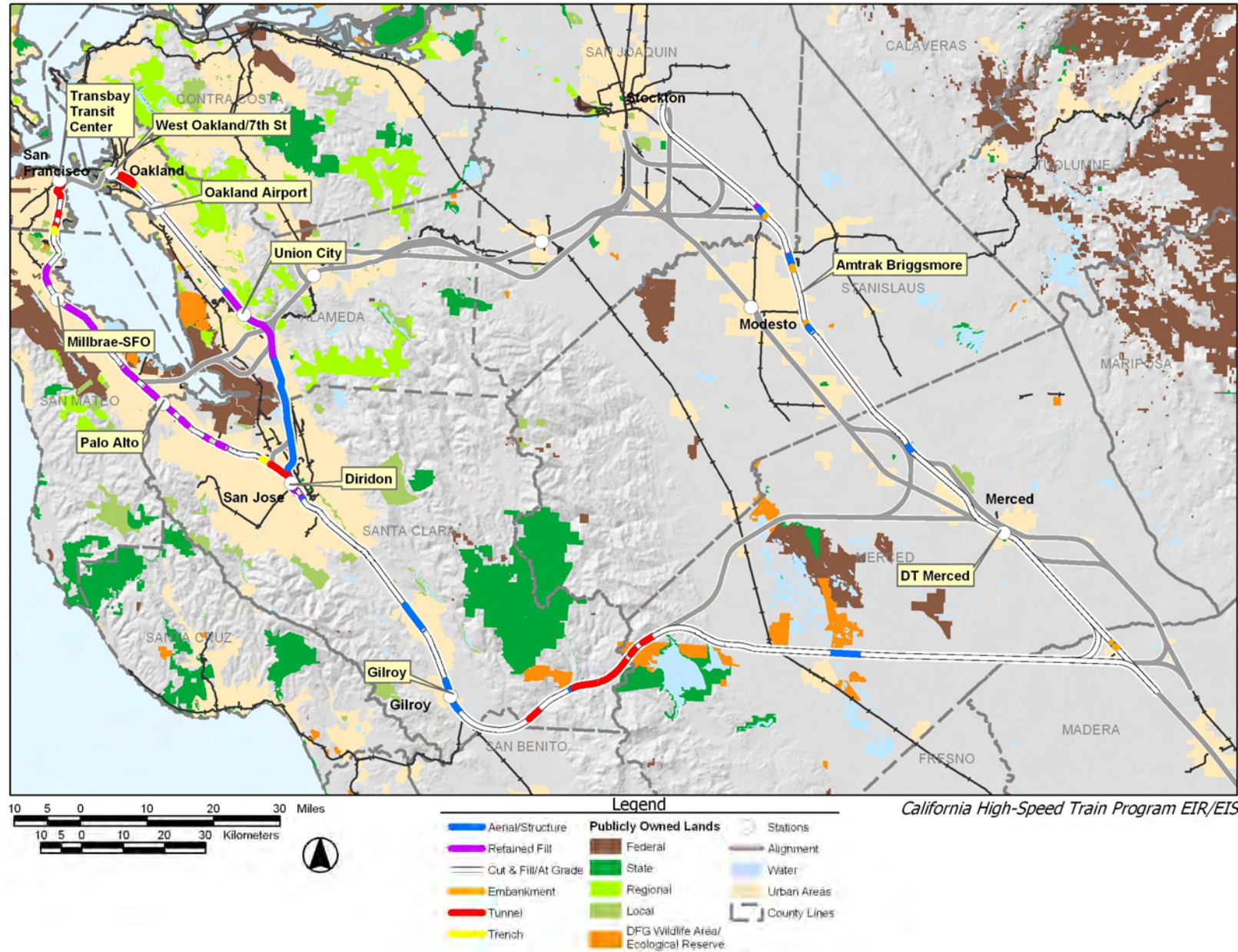


## C. SAN FRANCISCO, OAKLAND, AND SAN JOSE TERMINI

This network alternative is shown in Figure 7.2-14 and described in Table 7.2-14. The segments used for this representative alternative are Caltrain Corridor (SF to Dumbarton), Caltrain (Dumbarton to San Jose), Niles/I-880 (West Oakland to Niles Junction), Niles/I-880 (Niles Junction to San Jose via I-880), Pacheco (San Jose to Western Valley), Henry Miller (Western Valley to BNSF/UPRR), Henry Miller UPRR Connection, BNSF - UPRR.

**Table 7.2-14**  
**Pacheco Pass: San Francisco, Oakland, and San Jose Termini**

<b>Physical/Operational Characteristics</b>	
<b>Network Alternative Description</b>	From San Francisco to San Jose, this network alternative would use the existing Caltrain right-of-way. From Oakland to San Jose, the Niles/I-880 Alignment would be used. The Pacheco and Henry Miller (to the UPRR) Alternatives would be used between San Jose and the Central Valley, and the BNSF N/S (north of Merced) and UPRR N/S (south of Merced) Alignments would be used in the Central Valley. Station location options considered for this alternative are Transbay Transit Center, Millbrae/SFO, Redwood CityWest Oakland/7 <sup>th</sup> Street, Coliseum/Airport, Union City (BART), San Jose (Diridon), Gilroy (Caltrain), Merced (Downtown), and Briggsmore (Amtrak).
<b>Length</b>	309.60 mi (498.26 km)
<b>Cost (dollars)</b>	\$16.0 billion
<b>Express Travel Times (minutes)</b>	SF–LA=2:38; Oakland–LA=2:30; SJ–LA=2:09; SF–Sac=1:47; Oakland–Sac=1:38; SJ–Sac=1:18; SF–Fresno=1:20; Oakland–Fresno=1:12; SJ–Fresno=0:51; Gilroy–LA=1:57; SF–Gilroy=0:44; Oakland–Gilroy=0:36; SJ–Gilroy=0:15
<b>Ridership</b>	This network alternative would directly serve downtown San Francisco and San Francisco International Airport (SFO), San Jose and the I-880 corridor, Southern Santa Clara County, and the Central Valley. Total ridership is projected to be about 8% less than the Pacheco “Base Case” forecast or about 86.1 million passengers a year by 2030. Revenue for the statewide HST system with this network alternative is \$2.79 billion per year by 2030 (about 10% less than the Pacheco “Base”). Although this option serves additional markets than the Pacheco Base Case Alternative, the drop in system ridership is a result of the splitting of service between the San Francisco Peninsula and the East Bay (with half of the trains serving each side of the Bay). Additional frequency of service to San Francisco and Oakland (along with higher operational costs) would be needed to increase ridership for this network alternative.
<b>Constructability</b>	Portions of this network alternative are aligned in or along existing passenger rail lines and highways. Maintaining operations on the existing commuter rail service and automobile traffic while constructing grade separations, tunnels, elevated sections, and stations would involve major construction issues/challenges. However, the HST infrastructure could be constructed incrementally to minimize impact to existing operations.
<b>O &amp; M Cost (dollars per year)</b>	\$1,174 million
<b>Operational Issues</b>	Average Speed SF–LA=164.2 mph (273.6 kph); Oakland–LA=170.7 mph (284.6 kph); SJ–LA=179.5 mph (299.2 kph); SF–Sac=152.8 mph (254.7 kph); Oakland–Sac=163.5 mph (272.6 kph); SJ–Sac=174 mph (290 kph); SF–Fresno=139.5 mph (232.5 kph); Oakland–Fresno=150.5 mph (250.8 kph); SJ–Fresno=164.3 mph (273.8 kph); Gilroy–LA=183.2 mph (295.1 kph)



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**Figure 7.2-14**  
**Network Alternatives**  
**Pacheco Pass**  
**San Francisco, Oakland, and San Jose Termini**



**Table 7.2-14**  
**Pacheco Pass: San Francisco, Oakland, and San Jose Termini**

	<p>kph); SF–Gilroy=102.3 mph (170.6 kph); Oakland–Gilroy=116 mph (193.3 kph); SJ–Gilroy=114.6 mph (191 kph)</p> <p>Maximum Speed</p> <p>SF–LA=210 mph (350 kph); Oakland–LA=210 mph (350 kph); SJ–LA=210 mph (350 kph); SF–Sac=210 mph (350 kph); Oakland–Sac=210 mph (350 kph); SJ–Sac=210 mph (350 kph); SF–Fresno=210 mph (350 kph); Oakland–Fresno=210 mph (350 kph); SJ–Fresno=210 mph (350 kph); Gilroy–LA=210 mph (350 kph); SF–Gilroy=180mph (300 kph); Oakland–Gilroy=180 mph (300 kph); SJ–Gilroy=180 mph (300 kph)</p> <p>HST operations would need to be coordinated and integrated with Caltrain service. Based on forecasted travel demand, service was divided evenly between the peninsula and east bay market.</p>
<b>Potential Environmental Impacts</b>	
<b>Travel Conditions</b>	<p>The Caltrain corridor Alignment would bring direct HST service up the San Francisco Peninsula to downtown San Francisco with potential stations in downtown San Francisco, at SFO (Millbrae), and a mid-Peninsula station at Palo Alto. It would directly serve Oakland and the East Bay with stations at West Oakland/7<sup>th</sup> Street, the Oakland International Airport (Coliseum/BART), Union City (BART), San Jose (Diridon) and would serve southern Santa Clara County with a station at Gilroy (Caltrain). Service to the Central Valley would be at Merced (Downtown), and the Briggsmore (Amtrak) station. This network alternative would increase connectivity and accessibility to San Francisco, the Peninsula and SFO, the hub international airport for northern California, Oakland, the Oakland International Airport (Coliseum/BART), southern Alameda County, San Jose, Southern Santa Clara County and Monterey/ Santa Cruz/ Salinas area, and the Central Valley. The Gilroy station would be the closest HST station for Monterey, Santa Cruz, and San Benito counties. The HST Network Alternative would provide a safer, more reliable, energy-efficient intercity mode along the San Francisco Peninsula while improving the safety, reliability, and performance of the regional commuter service. The HST Network Alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic. The fully grade-separated Caltrain corridor north of Gilroy, Niles/I-880 Alignment between Oakland and Union City would improve local traffic flow and reduce air pollution at existing rail crossings. There would also be some grade separation improvements in the BNSF N/S (north of Merced) and UPRR N/S (south of Merced) in the Central Valley. This network alternative would not provide direct HST service to the I-580 corridor (Tri-Valley and Tracy).</p>
<b>Noise and Vibration:</b> <sup>i</sup> High, medium, or low potential impacts	<p>Medium potential of noise impacts for the overall alternative. All segments have a medium potential for noise impacts, with the expectation of Henry Miller and Henry Miller UPRR Connection, which have a low potential of noise impacts. Medium to high potential of vibration impacts for the overall alternative. Medium potential of vibration impacts from San Francisco to Dumbarton. High potential of vibration impacts from Dumbarton to San Jose. High potential of vibration impacts from Oakland to San Jose. Medium potential of vibration impacts, from San Jose to Gilroy and a low potential in the Central Valley.</p>
<b>Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice</b>	<p>Compatibility: Majority of network alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way for most of the alignment. It exhibits low compatibility where it connects to the UPRR N/S or BNSF N/S in the Chowchilla area and a medium compatibility along the BNSF N/S Alignment in the Central Valley.</p> <p>Environmental Justice: This network alternative has medium environmental justice impact rating for the Caltrain</p>



**Table 7.2-14**  
**Pacheco Pass: San Francisco, Oakland, and San Jose Termini**

	<p>Corridor between San Francisco and Gilroy, a medium impact rating for the east bay between Oakland and San Jose, and a low impact rating from Gilroy to the Central Valley. The BNSF N/S alignment has a medium impact rating except for low impact ratings in the Briggsmore and Chowchilla areas.</p> <p>Community: This network alternative would not affect community cohesion, given that the majority of the alignment is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: This network alternative has the potential for low property impacts as the alignment either traverses existing transportation right-of-way or through rural land.</p>
<b>Aesthetics and Visual Resources:</b> General impacts and rating.	<p>Segments visual ratings: (1) Caltrain – San Francisco to Dumbarton =low; (2) Caltrain – Dumbarton to San Jose =low; (3) Oakland to Niles Junction =low; (4) Niles Junction to San Jose =medium; (5) Pacheco =medium; (6) Henry Miller to UPRR =low; and (7) BNSF N/S =low. Overall network alternative rating is low to medium.</p>
<b>Farmlands:</b> <sup>ii</sup> Ac (ha) potentially affected	<p>Farmland: 1,378.7 ac (557.96 ha)</p> <p>Impact up to 669.7 ac (271.04 ha) of prime farmland. The majority of potential farmland impacts would occur along the Pacheco, Henry Miller, BNSF (North/South), and UPRR (North/South) segments. Overall, this network alternative along with the Oakland and San Jose Termini and San Jose, Oakland, and San Francisco via transbay tube would have the greatest potential impact on farmland within the Pacheco Pass network alternatives.</p>
<b>Cultural Resources and Paleontological Resources:</b> <sup>iii</sup> Potential presence of historical resources in area of potential effect	<p>There are 195 known cultural resources.</p> <p>Of the Pacheco Pass network alternatives, this network alternative was identified to have the highest number of known resources.</p> <p>This network alternative extends through numerous historic districts in San Francisco. Historic properties and buildings dating from the 1900s and industrial complexes from the 1920s are within the area of potential effects along with water delivery systems and canals dating from the 1890s, a sanitary sewer system, railroad facilities, freeway bridges dating from the 1940s, and residential properties dating from the 1880s. The Santa Clara de Asis Mission in San Jose includes both prehistoric and historic resources. Overall, this network alternative was identified as having a high sensitivity for cultural resources.</p>
<b>Hydrology and Water Resources:</b> <sup>iv</sup> Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	<p>Floodplains: 573.4 ac (232.03 ha) direct/ 1,813.9 ac (734.08 ha) indirect</p> <p>Streams: 24,401 linear ft (7,437.3 linear m) direct/ 104,672 linear ft (31,904.05 linear m) indirect</p> <p>Lakes/Waterbodies: 4.5 ac (1.81 ha) direct/ 21.0 ac (8.50 ha) indirect</p> <p>Of the Pacheco Pass network alternatives, this network alternative was identified to have the highest impact on waters including streams, rivers, and canals as well as floodplains, groundwater, and impaired waters. This network alternative was also identified as having the potential to encounter the most erosive soils.</p> <p>Potentially affect Guadalupe River, Pajaro River, San Joaquin River, Stanislaus River, Tuolumne River, Merced River, and Chowchilla River as well as the Hetch Hetchy Aqueduct and California Aqueduct among other water resources. Several watercourses would be crossed more than once. Includes tunnels that would avoid impacts on the floodplain and above ground water resources, and aerial structures that would minimize impact on floodplains and streams, creeks, and channels.</p>



**Table 7.2-14**  
**Pacheco Pass: San Francisco, Oakland, and San Jose Termini**

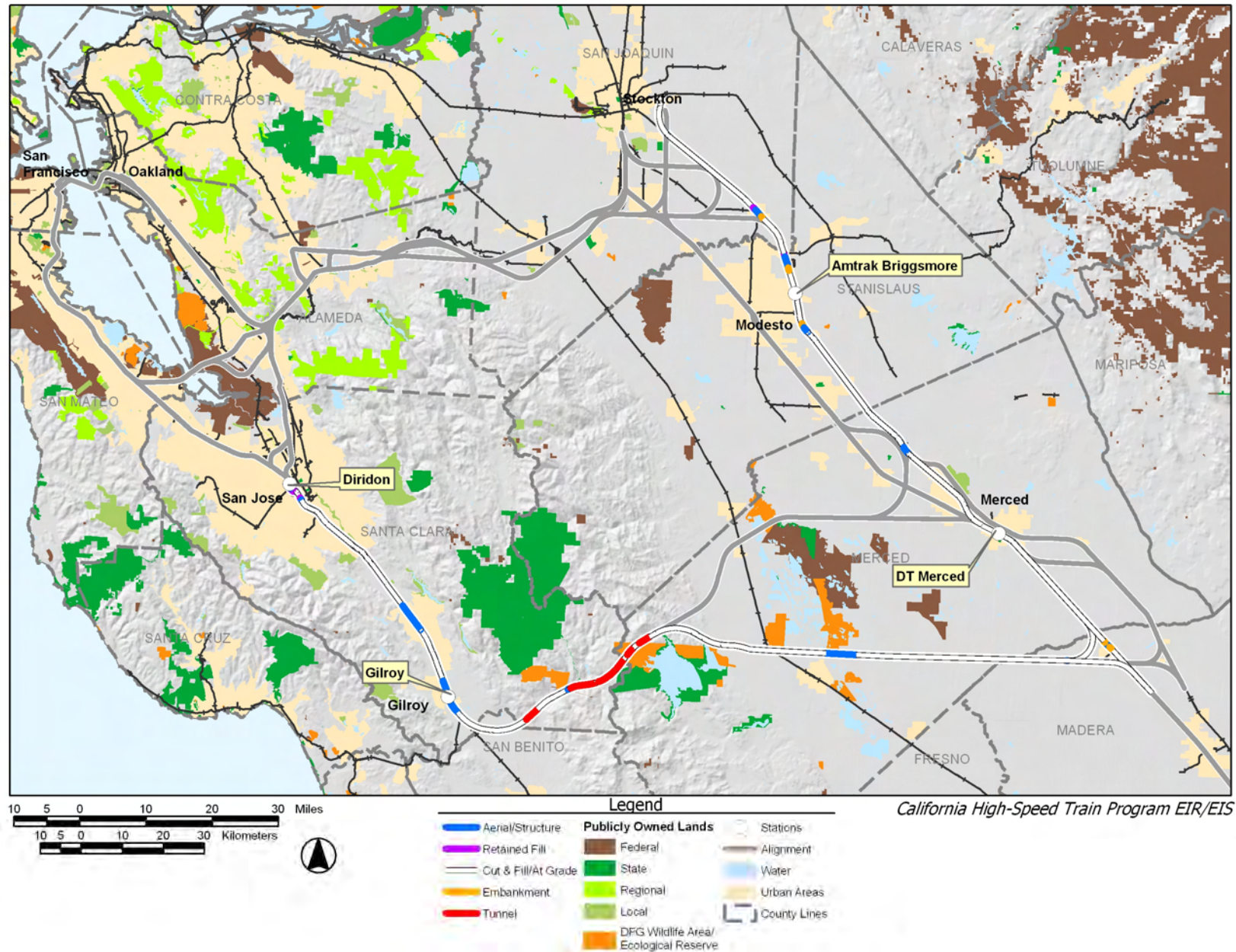
<b>Biological Resources Including Wetlands</b> Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	<p>Wetlands<sup>v</sup>: 17.5 ac (7.07 ha) direct/ 1,977 ac (800.2 ha) indirect</p> <p>Non-Wetland Waters: 15,123 linear ft (4,609.4 linear m)</p> <p>Species: 63 special-status plant and 53 special-status wildlife species</p> <p>Of the Pacheco Pass network alternatives, this network alternative would have the potential to impact the most special-status plant and wildlife species and waters. Potentially significant impacts to special-status plant and wildlife species, wetlands, and waters.</p> <p>Network alternative would be along existing transportation corridors with some portions in new rail corridors. Potentially result in a barrier to the movement of wildlife in areas where it severs wildlife movement corridors. Conflict with conservation and restoration plans and special management areas, such as the GEA. The placement of the alignment and stations and use of tunnels and aerial structures would minimize impacts on biological resources.</p>
<b>Fault Crossings</b>	<p>San Bruno (Potentially Active) – At Grade</p> <p>Buried Trace of Unnamed Fault (Potentially Active) – At Grade</p> <p>Hayward (Active) – At Grade - Adjacent and Parallel</p> <p>Hayward (Active) – At Grade</p> <p>Silver Creek (Potentially Active) – Above Grade</p> <p>Silver Creek (Potentially Active) – At Grade</p> <p>Calaveras (Active) – At Grade</p> <p>Ortigalita (Active) – At Grade</p>
<b>Section 4(f) and 6(f) Resources:</b> <sup>4</sup> Number of resources rated high potential direct effects	<p>There are 31 public parks, recreation lands, wildlife and waterfowl refuges that are 0–150 ft (46 m) from center of the network alternative. Few potential direct impacts are anticipated given that much of the network alternatives is within or directly adjacent to existing transportation rights-of-way, and few resources exist in areas where the network alternative is not adjacent to or within this existing right-of-way.</p>

## D. SAN JOSE TERMINUS

This network alternative is shown in Figure 7.2-15 and described in Table 7.2-15. The segments used for this representative alternative are Pacheco (San Jose to Western Valley), Henry Miller (Western Valley to BNSF/UPRR), Henry Miller UPRR Connection, BNSF - UPRR.

**Table 7.2-15**  
**Pacheco Pass: San Jose Terminus**

<b>Physical/Operational Characteristics</b>	
<b>Network Alternative Description</b>	From San Jose, this network alternative would use the Pacheco and Henry Miller (to the UPRR) Alignment Alternatives and the BNSF N/S (north of Merced) and UPRR N/S (south of Merced) Alignments would be used in the Central Valley. Station location options considered for this alternative are San Jose (Diridon), Gilroy (Caltrain), Merced (Downtown), and Briggsmore (Amtrak).
<b>Length</b>	213.15 mi (343.04 km)
<b>Cost (dollars)</b>	\$8.0 billion
<b>Express Travel Times (minutes)</b>	SJ-LA=2:09; SJ-Sac=1:18; SJ-Fresno=0:51; Gilroy-LA=1:57; SJ-Gilroy=0:15
<b>Ridership</b>	This network alternative would directly serve downtown San Jose and the Central Valley and would have considerably less ridership and revenue potential than other Network Alternatives that directly serve more stations in the Bay Area. Total ridership for this alternative is forecast at about 15% less than the Pacheco "Base Case" alternative, or at about 80.0 million passengers per year. Revenue for the statewide HST system with this network alternative is \$2.68 billion per year by 2030 (about 13.6% less than the Pacheco "Base").
<b>Constructability</b>	Portions of this network alternative are aligned in or along existing passenger rail lines. Maintaining operations on the existing passenger rail service and parallel roadways while constructing grade separations, tunnels, elevated sections, and stations would involve major construction issues/challenges. However, the HST infrastructure could be constructed incrementally to minimize impact to existing operations.
<b>O &amp; M Cost (dollars per year)</b>	\$1,099 million
<b>Operational Issues</b>	<p>Average Speed</p> <p>SJ-LA=179.5 mph (299.2 kph); SJ-Sac=174 mph (290 kph); SJ-Fresno=164.3 mph (273.8 kph); Gilroy-LA=183.2 mph (305.4 kph); SJ-Gilroy=114.6 mph (191 kph)</p> <p>Maximum Speed</p> <p>SJ-LA=210 mph (350 kph); SJ-Sac=210 mph (350 kph); SJ-Fresno=210 mph (350 kph); Gilroy-LA=210 mph (350 kph); SJ-Gilroy=180 mph (300 kph)</p> <p>HST operations would need to be coordinated and integrated with all transportation services at San Jose. HST operations would need to be coordinated and integrated with Caltrain service between San Jose and Gilroy.</p>



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Figure 7.2-15  
Network Alternatives  
Pacheco Pass  
San Jose Terminus



**Table 7.2-15  
Pacheco Pass: San Jose Terminus**

<b>Potential Environmental Impacts</b>	
<b>Travel Conditions</b>	This network alternative would increase connectivity and accessibility San Jose, Southern Santa Clara County and Monterey/ Santa Cruz/ Salinas area, and the Central Valley. The Gilroy station would be the closest HST station for Monterey, Santa Cruz, and San Benito counties. The HST Network Alternative would provide a safer, more reliable, energy-efficient intercity mode. The HST Network Alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic. The fully grade-separated Caltrain corridor between Gilroy and San Jose would improve local traffic flow and reduce air pollution at existing rail crossings. There would also be some grade separation benefits in the BNSF N/S (north of Merced) and UPRR N/S (south of Merced) in the Central Valley. This network alternative would not provide direct HST service to San Francisco, SFO, the SF Peninsula/Caltrain Corridor between San Francisco and San Jose, Oakland, Oakland Airport, the East Bay, south Alameda County, and the I-580 corridor resulting in considerably less Travel Conditions benefits (travel times, reliability, safety, connectivity, sustainable capacity, and passenger cost) than other network alternatives that directly serve additional stations/markets in the Bay Area.
<b>Noise and Vibration:</b> <sup>i</sup> High, medium, or low potential impacts	Medium potential of noise impacts for the overall alternative. All segments have a medium potential for noise impacts, with the expectation of Henry Miller and Henry Miller UPRR Connection, which have a low potential of noise impacts. Medium potential of vibration impacts for the overall alternative. Medium potential of vibration impacts, from San Jose to Gilroy and a low potential in the Central Valley.
<b>Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice</b>	<p>Compatibility: Majority of network alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way for most of the alignment. It exhibits low compatibility where it connects to the UPRR N/S or BNSF N/S in the Chowchilla area and a medium compatibility along the BNSF N/S Alignment in the Central Valley.</p> <p>Environmental Justice: This network alternative has medium environmental justice impact rating for the Caltrain Corridor between San Jose and Gilroy, and a low impact rating from Gilroy to the Central Valley. The BNSF N/S alignment has a medium impact rating except for low impact ratings in the Briggsmore and Chowchilla areas.</p> <p>Community: This network alternative would not affect community cohesion, given that the majority of the alignment is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: This network alternative has the potential for low property impacts as the alignment either traverses existing transportation right-of-way or through rural land.</p>
<b>Aesthetics and Visual Resources:</b> General impacts and rating	Segments visual ratings: (1) Pacheco =medium; (2) Henry Miller to UPRR =low; and (3) BNSF N/S =low. Overall network alternative rating is low to medium.
<b>Farmlands:</b> <sup>ii</sup> Ac (ha) potentially affected	<p>Farmland: 1,372.3 ac (555.36ha)</p> <p>Impact up to 663.3 ac (268.45 ha) of prime farmland. The majority of potential farmland impacts would occur along the Pacheco, Henry Miller, BNSF (North/South), and UPRR (North/South) segments. Overall, this network alternative along with the San Francisco and San Jose Termini and San Jose, San Francisco, and Oakland via transbay tube would have the Least Potential Impacts (LPI) to farmland within the Pacheco Pass network alternatives.</p>



**Table 7.2-15  
Pacheco Pass: San Jose Terminus**

<b>Cultural Resources and Paleontological Resources:</b> <sup>iii</sup> Potential presence of historical resources in area of potential effect	There are 78 known cultural resources. Of the Pacheco Pass network alternatives, this network alternative was identified to have the least number of known resources. Historic resources in small towns of Santa Clara Valley. Historic properties and buildings dating from the 1920s are within the area of potential effects along with water delivery systems and canals dating from the 1890s, a sanitary sewer system, railroad facilities, freeway bridges dating from the 1940s, and residential properties dating from the 1890s. Overall, this network alternative was identified as having a low sensitivity for cultural resources.
<b>Hydrology and Water Resources:</b> <sup>iv</sup> Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas	Floodplains: 424.9 ac (171.97 ha) direct/ 1,457.8 ac (589.97 ha) indirect Streams: 17,663 linear ft (5,383.7 linear m) direct/ 85,306 linear ft (26,001.25 linear m) indirect Lakes/Waterbodies: 3.8 ac (1.55 ha) direct/ 16.3 ac (6.60 ha) indirect Of the Pacheco Pass network alternatives, this network alternative was identified to have the least impact on water resources including streams, rivers, and canals, as well as lakes, floodplains, groundwater, and impaired waters. This network alternative was also identified as having the potential to encounter the least amount of erosive soils. Potentially affect Guadalupe River, Pajaro River, San Joaquin River, Stanislaus River, Tuolumne River, Merced River, and Chowchilla River as well as the Hetch Hetchy Aqueduct and California Aqueduct among other water resources. Several watercourses would be crossed more than once. Includes tunnels that would avoid impacts on the floodplain and above ground water resources, and aerial structures that would minimize impact on floodplains and streams, creeks, and channels.
<b>Biological Resources Including Wetlands</b> Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	Wetlands <sup>v</sup> : 15.5 ac (6.26 ha) direct/ 1,449 ac (586.6 ha) indirect Non-Wetland Waters: 14,395 linear ft (4,387.5 linear m) Species: 46 special-status plant and 38 special-status wildlife species Of the Pacheco Pass network alternatives, this network alternative would have the potential to impact the least special-status plant and wildlife species. This network alternative was also identified to have the least area of impact on wetlands and waters. Potentially significant impacts to special-status plant and wildlife species, wetlands, and waters. Network ALTERNATIVE would be along existing transportation corridors with some portions in new rail corridors. Potentially result in a barrier to the movement of wildlife in areas where it severs wildlife movement corridors. Conflict with conservation and restoration plans and special management areas, such as the GEA. The placement of the alignment and stations and use of tunnels and aerial structures would minimize impacts on biological resources.
<b>Fault Crossings</b>	Silver Creek (Potentially Active) – At Grade Calaveras (Active) – At Grade Ortigalita (Active) – At Grade
<b>Section 4(f) and 6(f) Resources:</b> <sup>4</sup> Number of resources rated high potential direct effects	There are eight public parks, recreation lands, wildlife and waterfowl refuges that are 0–150 ft (46 m) from center of the network alternative. Few potential direct impacts are anticipated given that much of the network alternatives is within or directly adjacent to existing transportation rights-of-way, and few resources exist in areas where the network alternative is not adjacent to or within this existing right-of-way.

## E. SAN JOSE, SAN FRANCISCO, AND OAKLAND – VIA TRANSBAY TUBE

This network alternative is shown in Figure 7.2-16 and described in Table 7.2-16. The segments used for this representative alternative are Trans Bay Crossing – Transbay Transit Center, Caltrain Corridor (SF to Dumbarton), Caltrain (Dumbarton to San Jose), Pacheco (San Jose to Western Valley), Henry Miller (Western Valley to BNSF/UPRR), Henry Miller UPRR Connection, BNSF - UPRR.

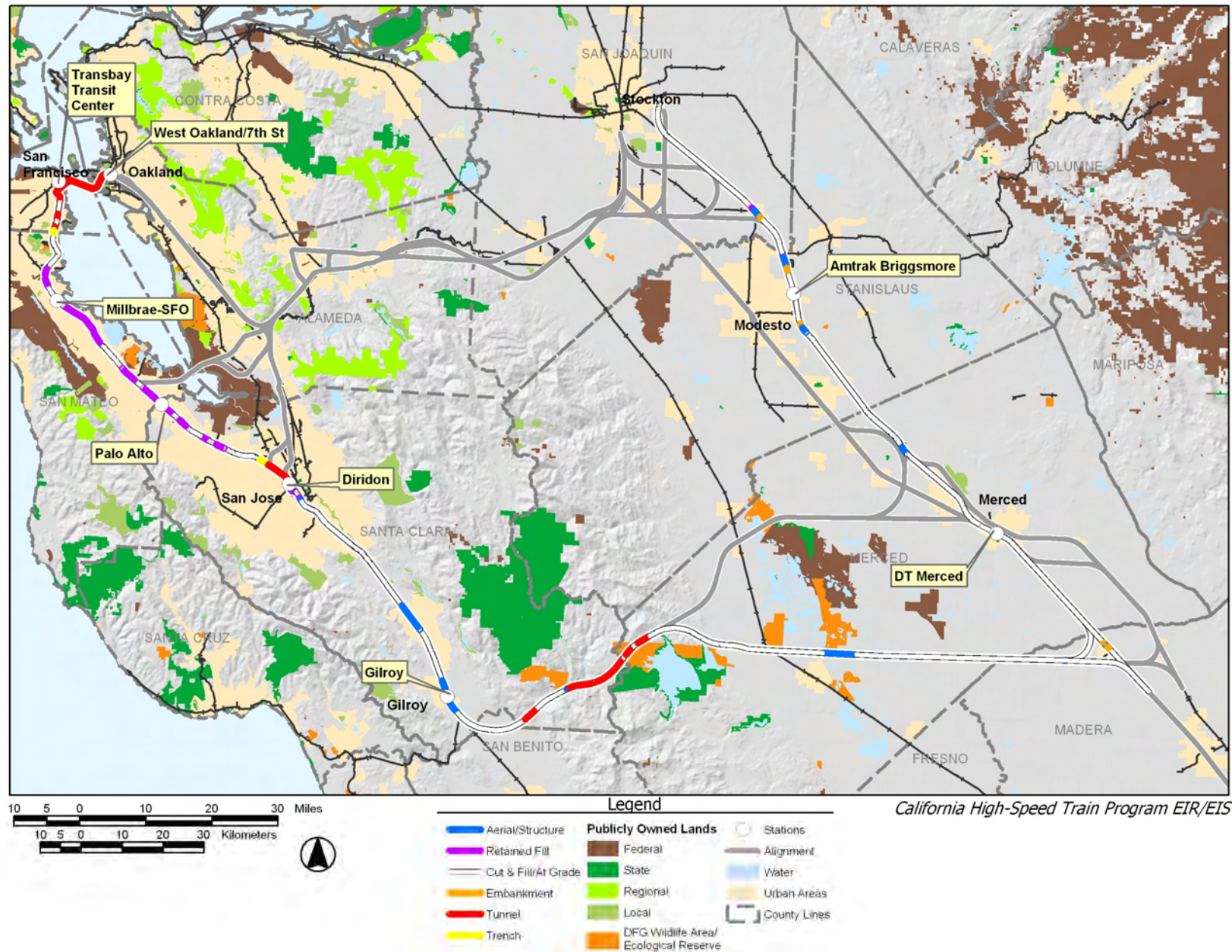
**Table 7.2-16**  
**Pacheco Pass: San Jose, San Francisco, and Oakland – via Transbay Tube**

<b>Physical/Operational Characteristics</b>	
<b>Network Alternative Description</b>	From Oakland to San Francisco, this network alternative would use a transbay tube crossing. From San Francisco to San Jose, this network alternative would use the existing Caltrain right-of-way. From San Jose, this network alternative would use the Pacheco and Henry Miller (to the UPRR) Alignment Alternatives and the BNSF N/S (north of Merced) and UPRR N/S (south of Merced) Alignments would be used in the Central Valley. Station location options considered for this alternative are West Oakland, Transbay Transit Center, Millbrae/SFO, Redwood City, San Jose (Diridon), Gilroy (Caltrain), Merced (Downtown), and Briggsmore (Amtrak).
<b>Length</b>	276.31 mi (444.69 km)
<b>Cost (dollars)</b>	\$17.0 billion
<b>Express Travel Times (minutes)</b>	SF–LA=2:38; Oakland–LA=2:43; SJ–LA=2:09; SF–Sac=1:47; Oakland–Sac=1:43; SJ–Sac=1:18; SF–Fresno=1:20; Oakland–Fresno=1:27; SJ–Fresno=0:51; Gilroy–LA=1:57; SF–Gilroy=0:44; Oakland–Gilroy=0:50; SJ–Gilroy=0:15
<b>Ridership</b>	This network alternative would directly serve Oakland, downtown San Francisco and San Francisco International Airport (SFO), San Jose, the Caltrain Corridor and the Central Valley and would have high ridership and revenue potential. Total ridership and revenue for the statewide HST system with this network alternative is forecast to be about 2% higher than the Pacheco “Base Case” alternative, or at about 95.8 million passengers a year by 2030. Revenue would be about \$3.16 billion a year by 2030.
<b>Constructability</b>	Constructing a new transbay tube between San Francisco and Oakland would involve major construction activities in the San Francisco Bay and special construction methods and mitigations would be required. Portions of this network alternative are aligned in or along existing passenger rail lines and highways. Maintaining operations on the existing commuter rail service and automobile traffic while constructing grade separations, tunnels, elevated sections, and stations would involve major construction issues/challenges. However, the HST infrastructure could be constructed incrementally to minimize impact to existing operations.
<b>O &amp; M Cost (dollars per year)</b>	1,196 million
<b>Operational Issues</b>	<p>Average Speed</p> <p>SF–LA=164.2 mph (273.6 kph); Oakland–LA=156.8 mph (261.3 kph); SJ–LA=179.5 mph (299.2 kph); SF–Sac=152.8 mph (254.7 kph); Oakland–Sac=147 mph (244.9 kph); SJ–Sac=174 mph (290 kph); SF–Fresno=139.5 mph (232.5 kph); Oakland–Fresno=132.9 mph (221.5 kph); SJ–Fresno=164.3 mph (273.8 kph); Gilroy–LA=183.2 mph (305.4 kph); SF–Gilroy=102.3 mph (170.6 kph); Oakland–Gilroy=98 mph (163.38 kph); SJ–Gilroy=114.6 mph (191 kph)</p> <p>Maximum Speed</p>

**Table 7.2-16**  
**Pacheco Pass: San Jose, San Francisco, and Oakland – via Transbay Tube**

	<p>SF–LA=210 mph (350 kph); Oakland–LA=210 mph (350 kph); SJ–LA=210 mph (350 kph); SF–Sac=210 mph (350 kph); Oakland–Sac=210 mph (350 kph); SJ–Sac=210 mph (350 kph); SF–Fresno=210 mph (350 kph); Oakland–Fresno=210 mph (350 kph); SJ–Fresno=210 mph (350 kph); Gilroy–LA=210 mph (350 kph); SF–Gilroy=180 mph (300 kph); Oakland–Gilroy=180 mph (300 kph); SJ–Gilroy=180 mph (300 kph)</p> <p>HST operations would need to be coordinated and integrated with Caltrain service.</p>
<b>Potential Environmental Impacts</b>	
<b>Travel Conditions</b>	<p>The Caltrain corridor Alignment would bring direct HST service up the San Francisco Peninsula to downtown San Francisco. The transbay tube would provide direct service to Oakland, with a station in West Oakland. The Caltrain Corridor would serve the San Francisco International Airport with a station at (Millbrae), and a mid-Peninsula station at Palo Alto. HST service to San Jose would be at the Diridon Station. The Gilroy Station would service Southern Santa Clara County, and the Central Valley would be served by stations in Merced and Briggsmore. This network alternative would increase connectivity and accessibility to Oakland, San Francisco, the Peninsula and SFO, the hub international airport for northern California, San Jose, Southern Santa Clara County and Monterey/ Santa Cruz/Salinas area, and the Central Valley. The HST Network Alternative would provide a safer, more reliable, energy-efficient intercity mode along the San Francisco Peninsula while improving the safety, reliability, and performance of the regional commuter service. The HST Network Alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic. The fully grade-separated Caltrain corridor north of Gilroy would improve local traffic flow and reduce air pollution at existing rail crossings. There would also be some grade separation benefits in the BNSF N/S (north of Merced) and UPRR N/S (south of Merced) segments in the Central Valley. This network alternative would not provide direct HST service to Oakland Airport, south Alameda County, and the I-580 corridor.</p>
<b>Noise and Vibration:</b> <sup>i</sup> High, medium, or low potential impacts	<p>Medium potential of noise impacts for the overall alternative. All segments have a medium potential for noise impacts, with the expectation of Henry Miller and Henry Miller UPRR Connection, which have a low potential of noise impacts. Medium to high potential of vibration impacts for the overall alternative. Medium potential of vibration impacts from San Francisco to Dumbarton. High potential of vibration impacts from Dumbarton to San Jose. Medium potential of vibration impacts, from San Jose to Gilroy and a low potential in the Central Valley.</p>
<b>Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice</b>	<p>Compatibility: Majority of network alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way for most of the alignment. It exhibits low compatibility where it connects to the UPRR N/S or BNSF N/S in the Chowchilla area and a medium compatibility along the BNSF N/S Alignment in the Central Valley.</p> <p>Environmental Justice: This network alternative has medium environmental impact justice rating for the Caltrain Corridor between San Francisco and Gilroy and a low impact rating from Gilroy to the Central Valley. The BNSF N/S alignment has a medium impact rating except for low impact ratings in the Briggsmore and Chowchilla areas.</p> <p>Community: This network alternative would not affect community cohesion, given that the majority of the alignment is within or immediately adjacent to an existing major rail or highway rights-of-way.</p>





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**Figure 7.2-16**  
**Network Alternatives**  
**Pacheco Pass**  
**San Jose, San Francisco, and Oakland—via Transbay Tube**





**Table 7.2-16**  
**Pacheco Pass: San Jose, San Francisco, and Oakland – via Transbay Tube**

	Property: This network alternative has the potential for low property impacts as the alignment either traverses existing transportation right-of-way or through rural land.
<b>Aesthetics and Visual Resources:</b> General impacts and rating.	Segments visual ratings: (1) Caltrain – San Francisco to Dumbarton =lo; (2) Caltrain – Dumbarton to San Jose =low; (3) Pacheco =medium; (4) Henry Miller to UPRR =low; (5) Trans Bay Crossing =none; and (6) BNSF N/S =low. Overall network alternative rating is low to medium.
<b>Farmlands:</b> <sup>ii</sup> Ac (ha) potentially affected	Farmland: 1,372.3 ac (555.36ha)  Impact up to 663.3 ac (268.45 ha) of prime farmland. The majority of potential farmland impacts would occur along the Pacheco, Henry Miller, BNSF (North/South), and UPRR (North/South) segments. Overall, this network alternative along with the San Francisco and San Jose Termini and San Jose Terminus a would have the Least Potential Impacts (LPI) to farmland within the Pacheco Pass network alternatives.
<b>Cultural Resources and Paleontological Resources:</b> <sup>iii</sup> Potential presence of historical resources in area of potential effect	There are 108 known cultural resources.  This network alternative extends through numerous historic districts in San Francisco. Historic properties and buildings dating from the 1900s are within the area of potential effects along with water delivery systems and canals dating from the 1890s, a sanitary sewer system, railroad facilities, freeway bridges dating from the 1940s, and residential properties dating from the 1880s. The area around the Trans Bay crossing likely includes historic artifacts from the Gold Rush period through the 1906 earthquake. The Santa Clara de Asis Mission in San Jose includes both prehistoric and historic resources. Overall, this network alternative was identified as having a moderate sensitivity for cultural resources.
<b>Hydrology and Water Resources:</b> <sup>iv</sup> Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	Floodplains: 520.8 ac (210.76 ha) direct/ 1,633.2 ac (660.96 ha) indirect  Streams: 20,276 linear ft (6,180.1 linear m) direct/ 90,572 linear ft (27,606.42 linear m) indirect  Lakes/Waterbodies: 40.3 ac (16.32 ha) direct/ 255.2 ac (103.27 ha) indirect  Potentially affect San Francisco Bay, Guadalupe River, Pajaro River, San Joaquin River, Stanislaus River, Tuolumne River, Merced River, and Chowchilla River as well as the Hetch Hetchy Aqueduct and California Aqueduct among other water resources. Several watercourses would be crossed more than once. Includes tunnels that would avoid impacts on the floodplain and above ground water resources, and aerial structures that would minimize impact on floodplains and streams, creeks, and channels.

**Table 7.2-16**  
**Pacheco Pass: San Jose, San Francisco, and Oakland – via Transbay Tube**

<b>Biological Resources Including Wetlands</b> Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	<p>Wetlands<sup>v</sup>: 38.4 ac (15.54 ha) direct/ 2,955 ac (1,195.9 ha) indirect</p> <p>Non-Wetland Waters: 14,395 linear ft (4,387.5 linear m)</p> <p>Species: 59 special-status plant and 53 special-status wildlife species</p> <p>Of the Pacheco Pass network alternatives, this network alternative along with two other network alternatives would have the potential to impact the most special-status wildlife species, and a substantial amount of wetlands as a result of the Trans Bay crossing. This alternative could potentially result in impacts on biological resources in San Francisco Bay, including potentially significant impacts to special-status plant and wildlife species, wetlands, and waters.</p> <p>Network alternative would be along existing transportation corridors with some portions in new rail corridors. Potentially result in a barrier to the movement of wildlife in areas where it severs wildlife movement corridors. Conflict with conservation and restoration plans and special management areas, such as the GEA. The placement of the alignment and stations and use of tunnels and aerial structures would minimize impacts on biological resources.</p>
<b>Fault Crossings</b>	<p>San Bruno (Potentially Active) – At Grade</p> <p>Buried Trace of Unnamed Fault (Potentially Active) – At Grade</p> <p>Silver Creek (Potentially Active) – At Grade</p> <p>Calaveras (Active) – At Grade</p> <p>Ortigalita (Active) – At Grade</p>
<b>Section 4(f) and 6(f) Resources:</b> <sup>4</sup> Number of resources rated high potential direct effects	<p>There are 19 public parks, recreation lands, wildlife and waterfowl refuges that are 0–150 ft (46 m) from center of the network alternative. Few potential direct impacts are anticipated given that much of the network alternatives is within or directly adjacent to existing transportation rights-of-way, and few resources exist in areas where the network alternative is not adjacent to or within this existing right-of-way.</p>

## F. SAN JOSE, OAKLAND, AND SAN FRANCISCO – VIA TRANSBAY TUBE

This network alternative is shown in Figure 7.2-17 and described in Table 7.2-17. The segments used for this representative alternative are Trans Bay Crossing – Transbay Transit Center, Niles/I-880 (West Oakland to Niles Junction), Niles/I-880 (Niles Junction to San Jose), Pacheco (San Jose to Western Valley), Henry Miller (Western Valley to BNSF/UPRR), Henry Miller UPRR Connection, BNSF - UPRR.

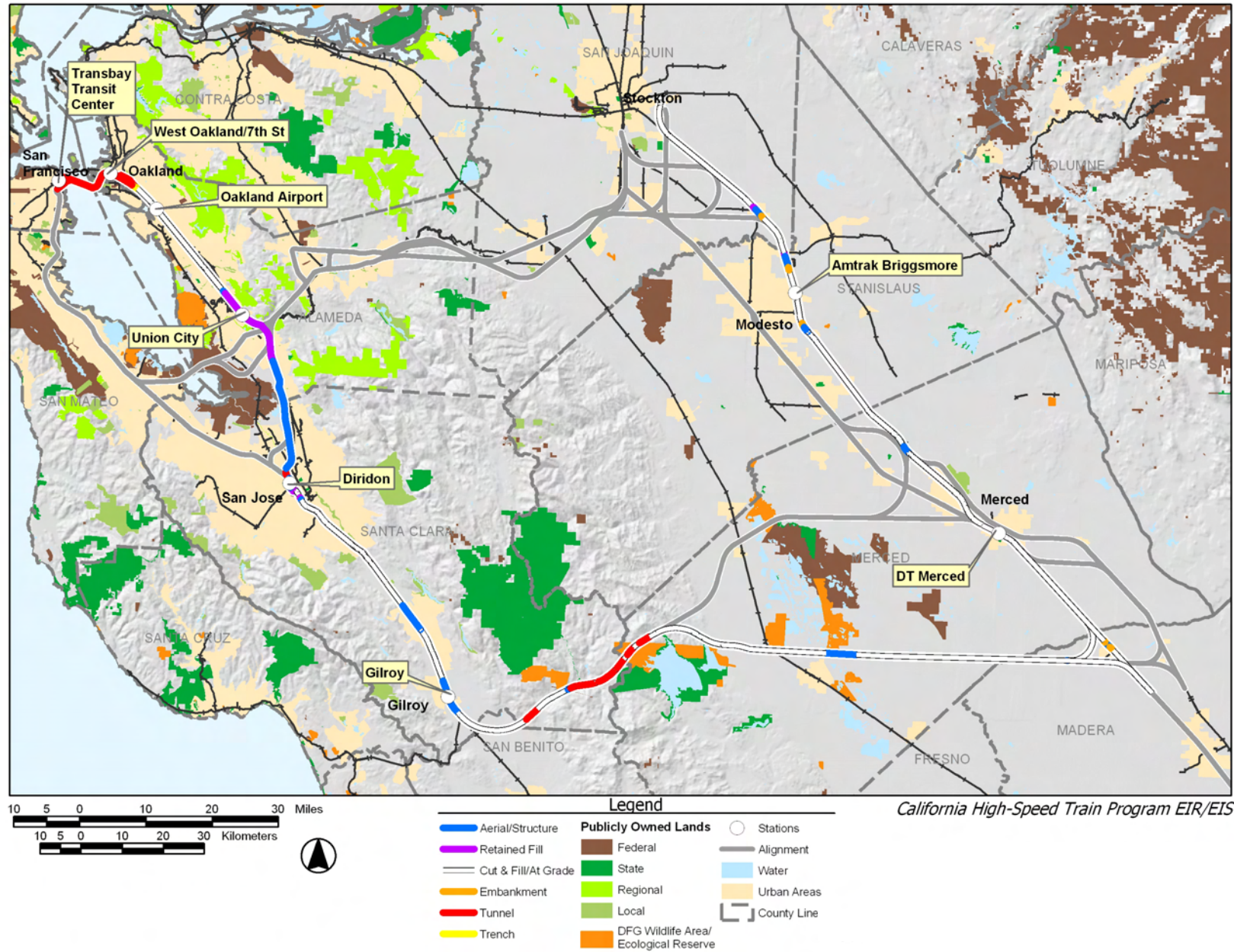
**Table 7.2-17**  
**Pacheco Pass: San Jose, Oakland, and San Francisco– via Transbay Tube**

<b>Physical/Operational Characteristics</b>	
<b>Network Alternative Description</b>	This network alternative would require a new transbay tube from San Francisco to Oakland. From Oakland to San Jose, this network alternative would use the Niles/I-880 Alignment. From San Jose, this network alternative would use the Pacheco and Henry Miller (to the UPRR) Alignment Alternatives and the BNSF N/S (north of Merced) and UPRR N/S (south of Merced) Alignments in the Central Valley. Station location options considered for this alternative are Transbay Transit Center, West Oakland/7 <sup>th</sup> Street, Coliseum/Airport, Union City (BART), San Jose (Diridon), Gilroy (Caltrain), Merced (Downtown), and Briggsmore (Amtrak).
<b>Length</b>	265.66 mi (427.54 km)
<b>Cost (dollars)</b>	\$16.3 billion
<b>Express Travel Times (minutes)</b>	SF–LA=2:35; Oakland–LA=2:30; SJ–LA=2:09; SF–Sac=1:52; Oakland–Sac=1:38; SJ–Sac=1:18; SF–Fresno=1:17; Oakland–Sac=1:12; SJ–Sac=0:51; Gilroy–LA=1:57; SF–Gilroy=0:40; Oakland–Gilroy=0:36; SJ–Gilroy=0:15
<b>Ridership</b>	This network alternative would directly serve downtown San Francisco, downtown Oakland and Oakland International Airport, Union City and San Jose, Southern Santa Clara County, and the Central Valley and would have high ridership and revenue potential. Total ridership and revenue for the statewide HST system with this network alternative is forecast to be about 1.6% less than the Pacheco “Base Case” alternative, or at 92.4 million passengers per year by 2030. Revenue is estimated at \$3.05 billion per year by 2030.
<b>Constructability</b>	Constructing a new transbay tube between Oakland and San Francisco would involve major construction activities in the San Francisco Bay and special construction methods and mitigations would be required. Portions of this network alternative are aligned in or along existing passenger rail lines and highways.  Maintaining operations on the existing commuter rail service and automobile traffic while constructing grade separations, tunnels, elevated sections, and stations would involve major construction issues/challenges. However, the HST infrastructure could be constructed incrementally to minimize impact to existing operations.
<b>O &amp; M Cost (dollars per year)</b>	\$1,179 million
<b>Operational Issues</b>	Average Speed  SF–LA=164.6 mph (274.4 kph); Oakland–LA=170.7 mph (284.6 kph); SJ–LA=179.5 mph (299.2 kph); SF–Sac=158 mph (263.3 kph); Oakland–Sac=163.5 mph (272.6 kph); SJ–Sac=174 mph (290 kph); Oakland–Fresno=150.5 mph (250.8 kph); SJ–Fresno=164.3 mph (273.8 kph); Gilroy–LA=183.2 mph (305.4 kph); SF–Gilroy=114.4 mph (190.7 kph); Oakland–Gilroy=116 mph (193.3 kph); SJ–Gilroy=114.6 mph (191 kph)

**Table 7.2-17**  
**Pacheco Pass: San Jose, Oakland, and San Francisco– via Transbay Tube**

	<p>Maximum Speed</p> <p>SF–LA=210 mph (350 kph); Oakland–LA=210 mph (350 kph); SJ–LA=210 mph (350 kph); SF–Sac=210 mph (350 kph); Oakland–Sac=210 mph (350 kph); SJ–Sac=210 mph (350 kph); SF–Fresno=210 mph (350 kph); Oakland–Sac=210 mph (350 kph); SJ–Sac=210 mph (350 kph); Gilroy–LA=210 mph (350 kph); SF–Gilroy=180 mph (300 kph); Oakland–Gilroy=180 mph (300 kph); SJ–Gilroy=180 mph (300 kph)</p> <p>HST operations would need to be coordinated and integrated with Caltrain service between San Jose and Gilroy.</p>
<b>Potential Environmental Impacts</b>	
<b>Travel Conditions</b>	<p>The Niles/I-880 Alignment would bring direct HST service up the East Bay and the transbay tube would provide direct service to downtown San Francisco. It would directly serve Oakland and the East Bay with stations at West Oakland/7<sup>th</sup> Street, Coliseum/Airport, Union City (BART), San Jose (Diridon) and would serve southern Santa Clara County with a station at Gilroy (Caltrain). Service to the Central Valley would be at Merced (Downtown), and Briggsmore (Amtrak) stations. This network alternative would increase connectivity and accessibility to San Francisco, Oakland, the Oakland International Airport (Coliseum/BART), southern Alameda County, San Jose, Southern Santa Clara County and Monterey/ Santa Cruz/ Salinas area, and the Central Valley. The Gilroy station would be the closest HST station for Monterey, Santa Cruz, and San Benito counties. The HST Network Alternative would provide a safer, more reliable, energy-efficient intercity mode along the East Bay while improving the safety, reliability, and performance of the regional commuter service. The HST Network Alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic. The fully grade-separated Caltrain corridor between Gilroy and San Jose, Niles/I-880 Alignment between Oakland and Union City would improve local traffic flow and reduce air pollution at existing rail crossings. There would also be some grade separation benefits in the BNSF N/S (north of Merced) and UPRR N/S (south of Merced) segments in the Central Valley. This network alternative would not provide direct service to SFO, the mid-SF Peninsula, and the I-580 corridor (the Tri-Valley, and Tracy).</p>
<b>Noise and Vibration:</b> <sup>i</sup> High, medium, or low potential impacts	<p>Medium potential of noise impacts for the overall alternative. All segments have a medium potential for noise impacts, with the expectation of Henry Miller and Henry Miller UPRR Connection, which have a low potential of noise impacts. Medium to high potential of vibration impacts for the overall alternative. Medium potential of vibration impacts from San Francisco to Dumbarton. High potential of vibration impacts from Oakland to San Jose. Medium potential of vibration impacts, from San Jose to Gilroy and a low potential in the Central Valley.</p>
<b>Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice</b>	<p>Compatibility: Majority of network alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way for most of the alignment. It exhibits low compatibility where it connects to the UPRR N/S or BNSF N/S in the Chowchilla area and a medium compatibility along the BNSF N/S Alignment in the Central Valley.</p> <p>Environmental Justice: This network alternative has medium environmental impact justice rating for the East Bay between Oakland and San Jose and for the Caltrain Corridor between San Jose and Gilroy, and a low impact rating from Gilroy to the Central Valley. The BNSF N/S alignment has a medium impact rating except for low impact ratings in the Briggsmore and Chowchilla areas.</p>





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**Figure 7.2-17**  
**Network Alternatives**  
**Pacheco Pass**  
**San Jose, Oakland, and San Francisco—via Transbay Tube**





**Table 7.2-17**  
**Pacheco Pass: San Jose, Oakland, and San Francisco– via Transbay Tube**

	<p>Community: This network alternative would not affect community cohesion, given that the majority of the alignment is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: This network alternative has the potential for low property impacts as the alignment either traverses existing transportation right-of-way or through rural land.</p>
<b>Aesthetics and Visual Resources:</b> General impacts and rating	Segments visual ratings: (1) Oakland to Niles Junction =low; (2) Niles Junction to San Jose =medium; (3) Pacheco =medium; (4) Henry Miller to UPRR =low; (5) Trans Bay Crossing =none; and (6) BNSF N/S =low. Overall network alternative rating is low to medium.
<b>Farmlands:</b> <sup>ii</sup> Ac (ha) potentially affected	<p>Farmland: 1,378.7 ac (557.96 ha)</p> <p>Impact up to 669.7 ac (271.04 ha) of prime farmland. The majority of potential farmland impacts would occur along the Pacheco, Henry Miller, BNSF (North/South), and UPRR (North/South) segments. Overall, this network alternative along with the Oakland and San Jose Termini and San Francisco, Oakland, and San Jose Termini would have the greatest potential impact on farmland within the Pacheco Pass network alternatives.</p>
<b>Cultural Resources and Paleontological Resources:</b> <sup>iii</sup> Potential presence of historical resources in area of potential effect	<p>There are 111 known cultural resources.</p> <p>Historic properties and industrial complexes dating from the 1920s and 1940s are within the area of potential effects along with water delivery systems and canals dating from the 1890s, a sanitary sewer system, railroad facilities, freeway bridges dating from the 1940s, and residential properties dating from the 1880s. The area around the Trans Bay crossing likely includes historic artifacts from the Gold Rush period through the 1906 earthquake. Overall, this network alternative was identified as having a low sensitivity for cultural resources.</p>
<b>Hydrology and Water Resources:</b> <sup>iv</sup> Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	<p>Floodplains: 477.5 ac (193.24 ha) direct/ 1,685.1 ac (681.98 ha) indirect</p> <p>Streams: 30,278 linear ft (9,228.9 linear m) direct/ 137,768 linear ft (41,991.56 linear m) indirect</p> <p>Lakes/Waterbodies: 41.0 ac (16.58 ha) direct/ 253.1 ac (102.43 ha) indirect</p> <p>Of the Pacheco Pass network alternatives, this network alternative was identified to have the highest amount of impact on lakes and the San Francisco Bay due to the Trans Bay crossing.</p> <p>Potentially affect San Francisco Bay, Guadalupe River, Pajaro River, San Joaquin River, Stanislaus River, Tuolumne River, Merced River, and Chowchilla River as well as the Hetch Hetchy Aqueduct and California Aqueduct among other water resources. Several watercourses would be crossed more than once. Includes tunnels that would avoid impacts on the floodplain and above ground water resources, and aerial structures that would minimize impact on floodplains and streams, creeks, and channels.</p>

**Table 7.2-17**  
**Pacheco Pass: San Jose, Oakland, and San Francisco– via Transbay Tube**

<b>Biological Resources Including Wetlands</b> Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	<p>Wetlands<sup>v</sup>: 40.2 ac (16.28 ha) direct/ 3,179 ac (1,286.5 ha) indirect  Non-Wetland Waters: 14,553 linear ft (4,429.6 linear m)  Species: 50 special-status plant and 49 special-status wildlife species</p> <p>Of the Pacheco Pass network alternatives, this network alternative along with one other network alternative would have the potential to impact the least special-status wildlife species. This network alternative along with two other network alternatives would have the potential to impact the most area of impact on wetlands. This alternative could potentially result in impacts on biological resources in San Francisco Bay as a result of the Trans Bay crossing. Potentially significant impacts to special-status plant and wildlife species, wetlands, and waters.</p> <p>Network alternative would be along existing transportation corridors with some portions in new rail corridors. Potentially result in a barrier to the movement of wildlife in areas where it severs wildlife movement corridors. Conflict with conservation and restoration plans and special management areas. The placement of the alignment and stations and use of tunnels and aerial structures would minimize impacts on biological resources.</p>
<b>Fault Crossings</b>	<p>Hayward (Active) – At Grade - Adjacent and Parallel  Hayward (Active) – At Grade  Silver Creek (Potentially Active) – Above Grade  Silver Creek (Potentially Active) – At Grade  Calaveras (Active) – At Grade  Ortigalita (Active) – At Grade</p>
<b>Section 4(f) and 6(f) Resources:</b> <sup>4</sup> Number of resources rated high potential direct effects	<p>There are 22 public parks, recreation lands, wildlife and waterfowl refuges that are 0–150 ft (46 m) from center of the network alternative. Few potential direct impacts are anticipated given that much of the network alternatives is within or directly adjacent to existing transportation rights-of-way, and few resources exist in areas where the network alternative is not adjacent to or within this existing right-of-way.</p>

### 7.2.3 Pacheco Pass with Altamont Pass (local service)

#### A. SAN FRANCISCO AND SAN JOSE TERMINI

This network alternative is shown in Figure 7.2-18 and described in Table 7.2-18. The segments used for this representative alternative are Caltrain Corridor (SF to Dumbarton), Caltrain (Dumbarton to San Jose), Dumbarton (High Bridge), UPRR (Niles to Altamont)<sup>14</sup>, Tracy Downtown (UPRR Connection)<sup>15</sup>, Pacheco (San Jose to Western Valley), Henry Miller (Western Valley to BNSF/UPRR), Henry Miller UPRR Connection, UPRR.

**Table 7.2-18**  
**Pacheco Pass with Altamont Pass (Local Service): San Francisco and San Jose Termini**

Physical/Operational Characteristics	
<b>Network Alternative Description</b>	From San Francisco to San Jose, this network alternative would use the existing Caltrain rail right-of-way. From San Jose, this network alternative would use the Pacheco and Henry Miller (to the UPRR) Alignment Alternatives and the UPRR N/S Alignment in the Central Valley. From Redwood City, this network alternative would also cross the San Francisco Bay in the Dumbarton Corridor. The Altamont Pass would use the UPRR Alignment through downtown Tracy. Station location options considered for this alternative are Transbay Transit Center, Millbrae/SFO, Palo Alto (Caltrain), San Jose (Diridon), Gilroy (Caltrain), Merced (Downtown), and Modesto (Downtown). Local HST Stations would be at Union City (Shinn), Pleasanton (I-680/Bernal Road), and Tracy (Downtown).
<b>Length</b>	339.16 mi (545.83 km)
<b>Cost (dollars)</b>	\$18.3 billion
<b>Express Travel Times (minutes)</b>	<p>Altamont</p> <p>SF–LA=2:45; SJ–LA=2:26; SF–Sac=1:15; SJ–Sac=0:56; SF–Fresno=1:27; SJ–Fresno=1:08; Pleasanton–LA=2:13; Tracy–LA=1:59; SF–Tracy=0:46; SJ–Tracy=0:27</p> <p>Pacheco</p> <p>SF–LA=2:38; SJ–LA=2:09; SF–Sac=1:47; SJ–Sac=1:18; SF–Fresno=1:20; SJ–Fresno=0:51; Gilroy–LA=1:57; SF–Gilroy=0:44; SJ–Gilroy=0:15</p>
<b>Ridership</b>	This network alternative would directly serve downtown San Francisco and San Francisco International Airport (SFO), San Jose, southern Santa Clara County, Southern Alameda County, the I-580 Corridor and Tri-Valley area and the Central Valley and would have high ridership and revenue potential. Total ridership for the statewide HST system with this network alternative is forecast to be about 3% higher than the Pacheco “Base Case” network alternative, or at 96.2 million passengers per year by 2030. However, revenue is estimated to be about 3.2 percent less than the

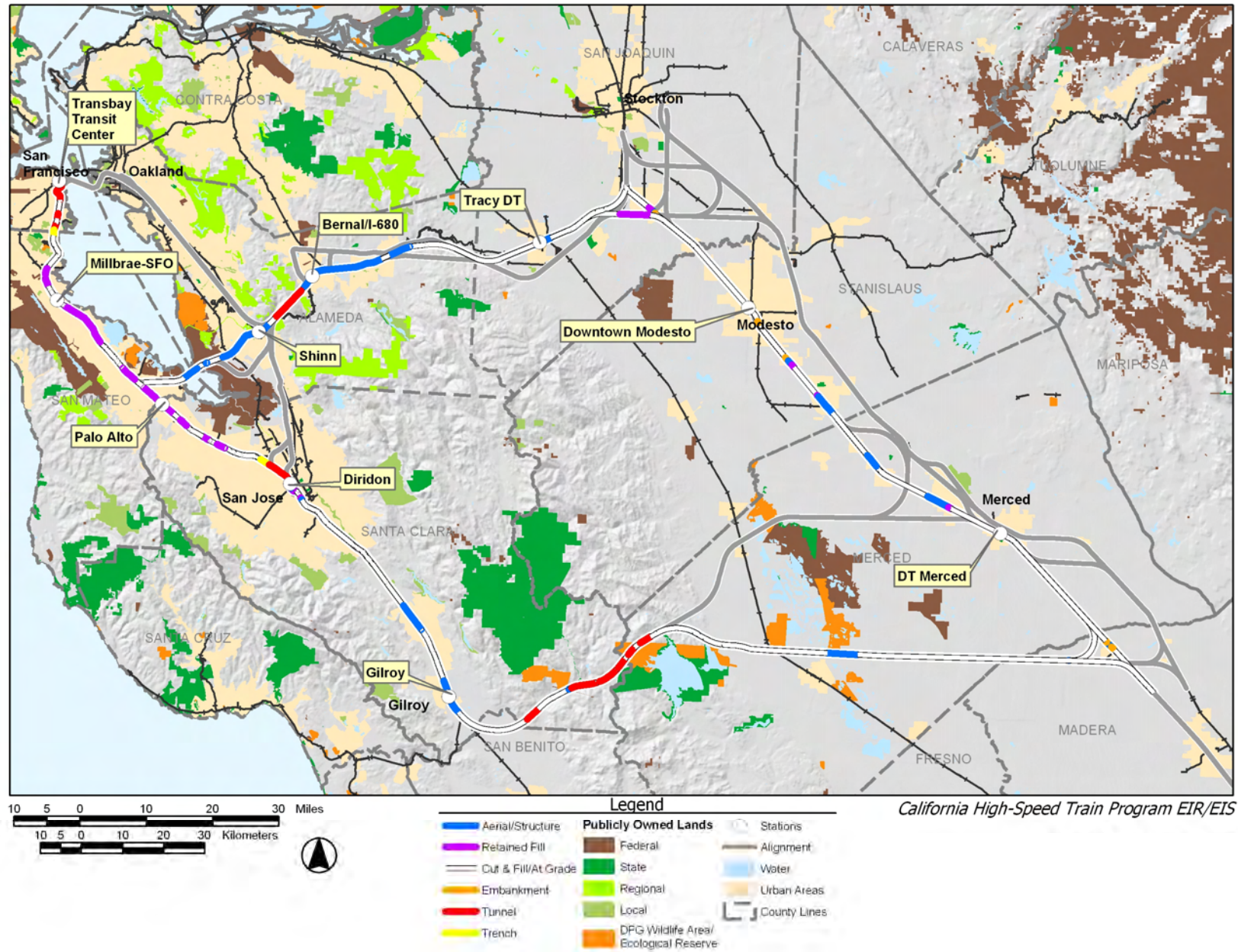
<sup>14</sup> Does not include “express tracks” through Pleasanton Station.

<sup>15</sup> Does not include “express tracks” through Tracy Downtown Station.

**Table 7.2-18**  
**Pacheco Pass with Altamont Pass (Local Service): San Francisco and San Jose Termini**

	Pacheco "Base Case" network alternative at \$2.99 billion per year by 2030.
<b>Constructability</b>	<p>Constructing a new bridge crossing along the Dumbarton corridor would involve major construction activities in sensitive wetlands, saltwater marshes, and aquatic habitat. Special construction methods and mitigations would be required. Portions of this network alternative are aligned in or along existing passenger rail lines and highways.</p> <p>Maintaining operations on the existing passenger rail service and automobile traffic while constructing grade separations, tunnels, elevated sections, and stations would involve major construction issues/challenges. However, the HST infrastructure could be constructed incrementally to minimize impact to existing operations.</p>
<b>O &amp; M Cost (dollars per year)</b>	\$1,171 million
<b>Operational Issues</b>	<p><b>Altamont</b></p> <p>Average Speed</p> <p>SF–LA=165.2_ mph (265.8 kph); SJ–LA=176.5 mph (284 kph); SF–Sac=121.3 mph (195.2 kph); SJ–Sac=135.3 mph (218.3 kph); SF–Fresno=137.3 mph (221.4 kph); SJ–Fresno=153.6 mph (247.8 kph); Pleasanton–LA=181.3 mph (292.3 kph); Tracy–LA=183.4 mph (305.7 kph); SF–Tracy=100.6 mph (162.3 kph); SJ–Tracy=115.7 mph (186.7 kph)</p> <p>Maximum Speed</p> <p>SF–LA=210 mph (350 kph); SJ–LA=210 mph (350 kph); SF–Sac=198 mph (330 kph); SJ–Sac=198 mph (330 kph); SF–Fresno=210 mph (350 kph); SJ–Fresno=210 mph (350 kph); Livermore–LA=210 mph (350 kph); Tracy–LA=210 mph (350 kph); SF–Tracy=169.2 mph (282 kph); SJ–Tracy=180 mph (300 kph)</p> <p><b>Pacheco</b></p> <p>Average Speed</p> <p>SF–LA=164.2 mph (273.6 kph); SJ–LA=179.5 mph (299.2 kph) ;SF–Sac=152.8 mph (254.7 kph); SJ–Sac=174_ mph (290 kph); SF–Fresno=139.5 mph (232.5 kph); SJ–Fresno=164.3 mph (273.8 kph); Gilroy–LA=183.2 mph (305.4 kph); SF–Gilroy=102.3 mph (170.6 kph); SJ–Gilroy=114.6 mph (191 kph)</p> <p>Maximum Speed</p> <p>SF–LA=210 mph (350 kph); SJ–LA=210 mph 350 kph) ;SF–Sac=210 mph (350 kph); SJ–Sac=210 mph (350 kph); SF–Fresno=210 mph (350 kph); SJ–Fresno=210 mph (350 kph); Gilroy–LA=210 mph (350 kph); SF–Gilroy=180mph (300 kph); SJ–Gilroy=180 mph (300 kph)</p> <p>HST operations would need to be coordinated and integrated with Caltrain service and ACE service. Using both the Pacheco and Altamont alignment alternatives to serve the Bay Area provides greater capacity, operating flexibility, and reliability (in terms of redundancy). To serve the additional markets, more train operations would be necessary.</p>





**Figure 7.2-18**  
**Network Alternatives**  
**Pacheco Pass with Altamont Pass (Local Service)**  
**San Francisco and San Jose Termini**



**Table 7.2-18**  
**Pacheco Pass with Altamont Pass (Local Service): San Francisco and San Jose Termini**

<b>Potential Environmental Impacts</b>	
<b>Travel Conditions</b>	<p>The Caltrain corridor Alignment would bring direct HST service up the San Francisco Peninsula to downtown San Francisco with potential stations in downtown San Francisco, at SFO (Millbrae), a mid-Peninsula station at Palo Alto, and a San Jose Station (Diridon). HST service would be provided to Southern Santa Clara County at a Gilroy Station, with service to the Central Valley at Merced and Modesto. The Altamont Pass would use the UPRR Alignment with stations in Union City (Shinn), Pleasanton (I-680/Bernal), and downtown Tracy. This network alternative would increase connectivity and accessibility to San Francisco, the Peninsula and SFO, the hub international airport for northern California, southern Alameda County, San Jose, Southern Santa Clara County and Monterey/ Santa Cruz/ Salinas area, the I-580 Corridor and Tri-Valley area, and the Central Valley. The Gilroy station would be the closest HST station for Monterey, Santa Cruz, and San Benito counties. The HST Network Alternative would provide a safer, more reliable, energy-efficient intercity mode along the San Francisco Peninsula while improving the safety, reliability, and performance of the regional commuter service. The HST Network Alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic. The fully grade-separated Caltrain corridor north of Gilroy would improve local traffic flow and reduce air pollution at existing rail crossings. There would also be some grade separation benefits in the UPRR in the I-580 corridor and UPRR N/S Alignment segments through the Central Valley. This network alternative would not provide direct HST service to Oakland, and Oakland Airport.</p>
<b>Noise and Vibration:</b> <sup>i</sup> High, medium, or low potential impacts	<p>Medium potential of noise impacts for the overall alternative. All segments have a medium potential for noise impacts, with the expectation of Henry Miller and Henry Miller UPRR Connection, which have a low potential of noise impacts and the Dumbarton (High Bridge) which has a high potential of noise impacts. Medium to high potential of vibration impacts for the overall alternative. Medium potential of vibration impacts from San Francisco to Dumbarton. High potential of vibration impacts from Dumbarton to San Jose. Medium potential of vibration impacts, from San Jose to Gilroy and San Jose to Tracy. The Central Valley has a low potential for vibration impacts.</p>
<b>Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice</b>	<p><b>Compatibility:</b> Majority of network alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way for most of the alignment. It exhibits low compatibility where it connects to the UPRR N/S in the Chowchilla area. It exhibits low compatibility where it does not follow a transportation right-of-way in the Altamont Pass area. It exhibits a medium to high compatibility where it crosses the San Francisco Bay, in Fremont along the more narrow Centerville line, in the Shinn area. It has a medium compatibility in the Lathrop, Manteca, Modesto and Merced areas.</p> <p><b>Environmental Justice:</b> This network alternative has medium environmental justice impact rating for the Caltrain Corridor between San Francisco and Gilroy and low environmental justice impact rating for the UPRR alignment from Niles Canyon to the Central Valley. It has a low impact rating between Gilroy and the Central Valley, and a medium impact rating in the Central Valley except in the Manteca area, where the rating is low.</p> <p><b>Community:</b> This network alternative would not affect community cohesion, given that the majority of the alignment is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p><b>Property:</b> This network alternative has the potential for high property impacts in the Niles Canyon and Manteca areas, where additional right-of-way would be required.</p>

**Table 7.2-18**  
**Pacheco Pass with Altamont Pass (Local Service): San Francisco and San Jose Termini**

<b>Aesthetics and Visual Resources:</b> General impacts and rating.	Segments visual ratings: (1) Caltrain – San Francisco to Dumbarton =low; (2) Caltrain – Dumbarton to San Jose =low; (3) Pacheco =medium; (4) Henry Miller to UPRR =low; (5) UPRR =medium; (6) Tracy Downtown =low; (7) Dumbarton High Bridge =medium; and (8) UPRR N/S =low. Overall network alternative rating is low to medium.
<b>Farmlands:</b> <sup>ii</sup> Ac (ha) potentially affected	Farmland: 1,380.0 ac (558.49 ha)  Impact up to 760.4 ac (307.73 ha) of prime farmland. The majority of potential farmland impacts would occur along the Tracy, Pacheco, Henry Miller and UPRR (North/South) segments. Overall, this network alternative would have the Least Potential Impact (LPI) to farmland within the Pacheco Pass with Altamont (local service) network alternatives.
<b>Cultural Resources and Paleontological Resources:</b> <sup>iii</sup> Potential presence of historical resources in area of potential effect	There are 198 known cultural resources.  This network alternative extends through numerous historic districts in San Francisco. Historic properties and buildings dating from the 1900s are within the area of potential effects along with water delivery systems and canals dating from the 1890s, railroad facilities, freeway bridges dating from the 1940s, and residential properties dating from the 1880s. The area around San Jose has a high density of cultural resources. Archaeological resources in the area of the Dumbarton crossing include prehistoric sites associated with burials, and historic sites from early 1900s industrial activities. Overall, this network alternative was identified as having a high sensitivity for cultural resources.
<b>Hydrology and Water Resources:</b> <sup>iv</sup> Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	Floodplains: 547.1 ac (221.39 ha) direct/ 3,410.6 ac (1,380.28 ha) indirect Streams: 27,130 linear ft (8,269.2 linear m) direct/ 125,490 linear ft (38,249.22 linear m) indirect Lakes/Waterbodies: 41.9 ac (16.97 ha) direct/ 164.9 ac (66.72 ha) indirect  Of the Pacheco Pass with Altamont Pass (local service) network alternatives, this network alternative was identified to have the highest impact on lakes and the San Francisco Bay as a result of the Dumbarton crossing.  Potentially affect San Francisco Bay, Guadalupe River, Pajaro River, San Joaquin River, Stanislaus River, Tuolumne River, Merced River, and Chowchilla River as well as the Hetch Hetchy Aqueduct, South Bay Aqueduct, and California Aqueduct among other water resources. Several watercourses would be crossed more than once. Includes tunnels that would avoid impacts on the floodplain and above ground water resources, and aerial structures that would minimize impact on floodplains and streams, creeks, and channels.

**Table 7.2-18**  
**Pacheco Pass with Altamont Pass (Local Service): San Francisco and San Jose Termini**

<b>Biological Resources Including Wetlands</b> Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	<p>Wetlands<sup>v</sup>: 56.1 ac (22.72 ha) direct/ 3,499 ac (1,416.0 ha) indirect</p> <p>Non-Wetland Waters: 19,891 linear ft (6,062.9 linear m)</p> <p>Species: 70 special-status plant and 57 special-status wildlife species</p> <p>Of the Pacheco Pass with Altamont Pass (local service) network alternatives, this network alternative would have the potential to impact the most area of wetlands and waters. This alternative could potentially result in impacts on biological resources in San Francisco Bay as a result of the Dumbarton crossing. Potentially significant impacts on special-status plant and wildlife species, wetlands, and waters.</p> <p>Network alternative would be along existing transportation corridors with some portions in new rail corridors. Potentially result in a barrier to the movement of wildlife in areas where it severs wildlife movement corridors. Conflict with conservation and restoration plans and special management areas, such as the GEA and Don Edwards San Francisco Bay National Wildlife Refuge. The placement of the alignment and stations and use of tunnels and aerial structures would minimize impacts on biological resources.</p>
<b>Fault Crossings</b>	<p>San Bruno (Potentially Active) – At Grade</p> <p>Buried Trace of Unnamed Fault (Potentially Active) – At Grade</p> <p>Silver Creek (Potentially Active) – At Grade</p> <p>Calaveras (Active) – At Grade</p> <p>Ortigalita (Active) – At Grade</p> <p>Calaveras (Active) – Tunnel</p> <p>Livermore (Potentially Active) – Above Grade</p> <p>Greenville (Active) – Above Grade</p> <p>Vernalis (Active) – At Grade</p> <p>Buried Trace of Unnamed Fault (Potentially Active) - At Grade</p> <p>Silver Creek (Potentially Active) - At Grade</p> <p>Hayward (Active) - Above Grade</p> <p>Mission (Potentially Active) - At Grade</p>
<b>Section 4(f) and 6(f) Resources:</b> <sup>4</sup> Number of resources rated high potential direct effects	<p>There are 35 public parks, recreation lands, wildlife and waterfowl refuges that are 0–150 ft (46 m) from center of the network alternative. Few potential direct impacts are anticipated given that much of the network alternatives is within or directly adjacent to existing transportation rights-of-way, and few resources exist in areas where the network alternative is not adjacent to or within this existing right-of-way. Exceptions include the Augustin-Bernal Park.</p>



## B. OAKLAND AND SAN JOSE TERMINI

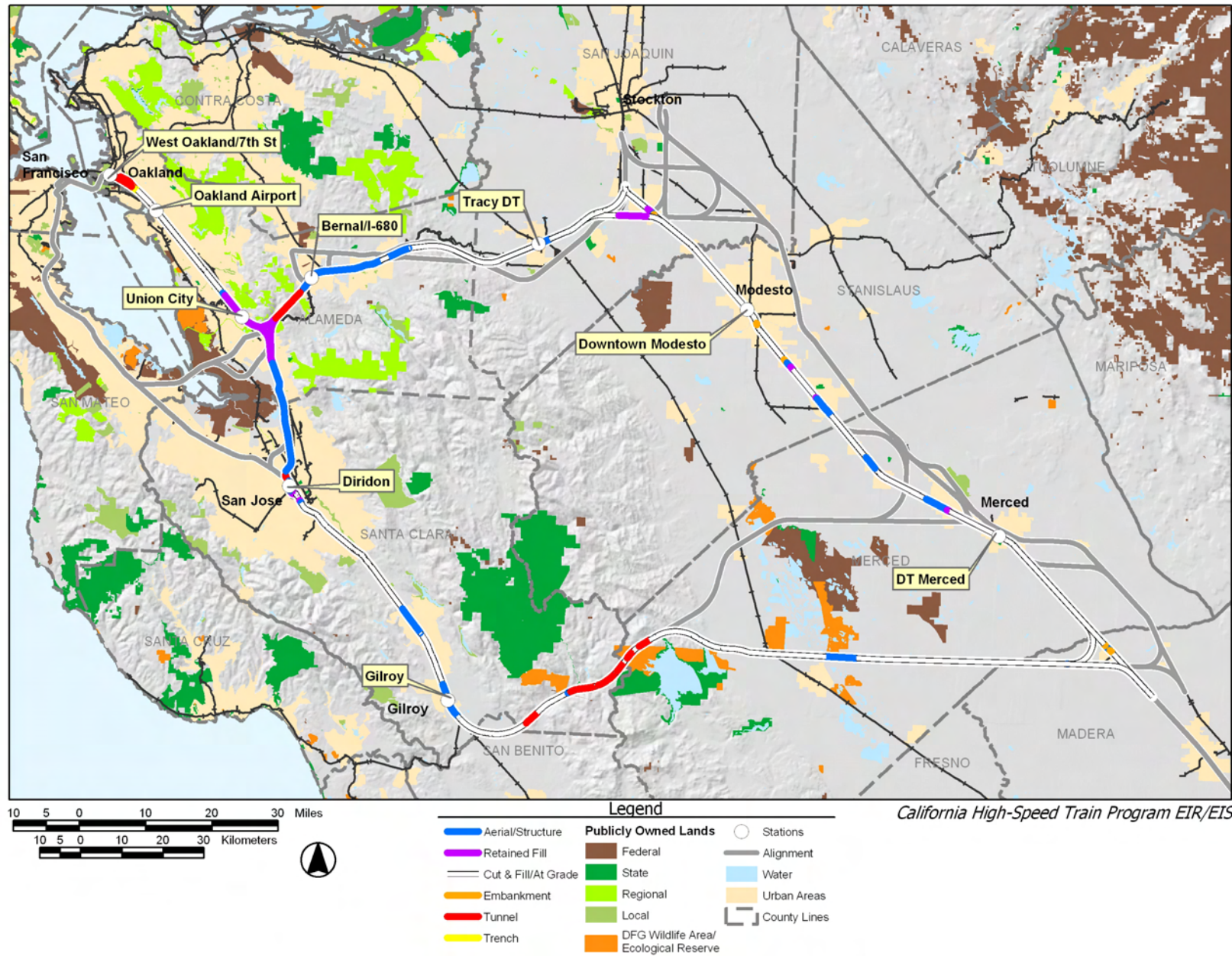
This network alternative is shown in Figure 7.2-19 and described in Table 7.2-19. The segments used for this representative alternative are Niles/I-880 (West Oakland to Niles Junction), Niles/I-880 (Niles Junction to San Jose via I-880), East Bay Connections (Dumbarton/Niles XN & Dumbarton/Niles XS), UPRR (Niles to Altamont)<sup>16</sup>, Tracy Downtown (UPRR Connection)<sup>17</sup>, Pacheco (San Jose to Western Valley), Henry Miller (Western Valley to BNSF/UPRR), Henry Miller UPRR Connection, UPRR (Central Valley).

**Table 7.2-19**  
**Pacheco Pass with Altamont (Local Service): Oakland and San Jose Termini**

<b>Physical/Operational Characteristics</b>	
<b>Network Alternative Description</b>	From Oakland to San Jose, this network alternative would use the Niles/I-880 Alignment. From San Jose, this network alternative would use the Pacheco and Henry Miller (to the UPRR) Alignment Alternatives and the UPRR N/S Alignment in the Central Valley. The UPRR Alignment through Downtown Tracy would be used for the Altamont Pass. Station location options considered for this alternative are West Oakland/7 <sup>th</sup> Street, Coliseum/Airport, Union City (BART), San Jose (Diridon), Gilroy (Caltrain), Merced (Downtown), and Modesto (Downtown). Local HST Stations would be at Pleasanton (I-680/Bernal Road), and Tracy (Downtown).
<b>Length</b>	318.45 mi (512.50 km)
<b>Cost (dollars)</b>	\$16.0 billion
<b>Express Travel Times (minutes)</b>	<p>Altamont</p> <p>Oakland–LA=2:30; SJ–LA=2:26; Oakland–Sac=1:00; SJ–Sac=0:56; Oakland–Fresno=1:11; SJ–Fresno=1:08; Pleasanton–LA=2:13; Tracy–LA=1:59</p> <p>Pacheco</p> <p>Oakland–LA=2:30; SJ–LA=2:09; Oakland–Sac=1:38; SJ–Sac=1:18; Oakland–Fresno=1:12; SJ–Fresno=0:51; Gilroy–LA=1:57; Oakland–Gilroy=0:36; SJ–Gilroy=0:15</p>
<b>Ridership</b>	This network alternative would directly serve downtown Oakland and Oakland International Airport (SFO), San Jose, south Santa Clara County, and the Central Valley and would have high ridership and revenue potential. Total ridership for the statewide HST system with this network alternative is forecast to be about 1% less than the Pacheco “Base Case” alternative, or at 92.9 million passengers per year by 2030. Revenue is estimated at \$3.07 billion per year by 2030.
<b>Constructability</b>	Portions of this network alternative are aligned in or along existing passenger rail lines and highways. Maintaining operations on the existing passenger rail service and automobile traffic while constructing grade separations, tunnels, elevated sections, and stations would involve major construction issues/challenges. However, the HST infrastructure could be constructed incrementally to minimize impact to existing operations.

<sup>16</sup> Does not include “express tracks” through Pleasanton Station.

<sup>17</sup> Does not include “express tracks” through Tracy Downtown Station.



U.S. Department  
of Transportation  
**Federal Railroad  
Administration**

**Figure 7.2-19**  
**Network Alternatives**  
**Pacheco Pass with Altamont (Local Service)**  
**Oakland and San Jose Termini**



**Table 7.2-19**  
**Pacheco Pass with Altamont (Local Service): Oakland and San Jose Termini**

<b>O &amp; M Cost (dollars per year)</b>	\$1,140 million
<b>Operational Issues</b>	<p>Altamont</p> <p>Average Speed</p> <p>Oakland–LA=173.6 mph (280.0 kph); SJ–LA=176.1 mph (284.0 kph); Oakland–Sac=132.1 mph (213.0 kph); SJ–Sac=135.3 mph (218.3 kph); Oakland–Fresno=152.4 mph (245.8 kph); SJ–Fresno=153.6 mph (247.8 kph); Pleasanton–LA=181.3 mph (292.3 kph); Tracy–LA=183.4 mph (305.7 kph); Oakland–Tracy=116.6 mph (194.3 kph); SJ–Tracy=120.7 mph (201.2 kph)</p> <p>Maximum Speed</p> <p>Oakland–LA=210 mph (350 kph); SJ–LA=210 mph (350 kph); Oakland–Sac=198 mph (330 kph); SJ–Sac=198 mph (330 kph); Oakland–Fresno=210 mph (350 kph); SJ–Fresno=210 mph (350 kph); Livermore–LA=210 mph (350 kph); Tracy–LA=210 mph (350 kph); Oakland–Tracy=178.2 mph (297 kph); SJ–Tracy=180 mph (300 kph);</p> <p>Using both the Pacheco and Altamont alignment alternatives to serve the Bay Area provides greater capacity, operating flexibility, and reliability (in terms of redundancy). In order to serve the additional markets, more train operations would be necessary. HST operations would need to be coordinated and integrated with ACE service.</p> <p>Pacheco</p> <p>Average Speed</p> <p>Oakland–LA=170.7 mph (284.6 kph); SJ–LA=179.5 mph (299.2 kph); Oakland–Sac=163.5 mph (272.6 kph); SJ–Sac=174 mph (290 kph); Oakland–Fresno=150.5 mph (250.8 kph); SJ–Fresno=164.3 mph (273.8 kph); Gilroy–LA=183.2 mph (305.4 kph); Oakland–Gilroy=116 mph (193.3 kph); SJ–Gilroy=114.6 mph (191 kph)</p> <p>Maximum Speed</p> <p>Oakland–LA=210 mph (350 kph); SJ–LA=210 mph (350 kph); Oakland–Sac=210 mph (350 kph); SJ–Sac=210 mph (350 kph); Oakland–Fresno=210_ mph (350 kph); SJ–Fresno=210 mph (350); Gilroy–LA=210 mph (350 kph); Oakland–Gilroy=180 mph (300 kph); SJ–Gilroy=180 mph (300 kph)</p>
<b>Potential Environmental Impacts</b>	
<b>Travel Conditions</b>	<p>This network alternative would provide direct service to Oakland with a station in West Oakland, to the Oakland International Airport with a Coliseum/BART station, to Southern Alameda County with a station at Union City (BART), to San Jose at the Diridon Station, to Southern Santa Clara County with a Gilroy Station, and to the Central Valley with stations at Merced and Modesto. The Altamont Pass would use the UPRR Alignment with local HST stations at Pleasanton (I-680/Bernal), and downtown Tracy. This network alternative would increase connectivity and accessibility to Oakland, the Oakland International Airport (Coliseum/BART), southern Alameda County, San Jose, Southern Santa Clara County and Monterey/ Santa Cruz/ Salinas area, the I-580 Corridor and Tri-Valley area, and the Central Valley. The Gilroy station would be the closest HST station for Monterey, Santa Cruz, and San Benito counties. The HST Network Alternative would provide a safer, more reliable, energy-efficient intercity mode of travel while improving the safety, reliability, and performance of the regional commuter service. The HST Network Alternative would greatly increase the</p>

**Table 7.2-19**  
**Pacheco Pass with Altamont (Local Service): Oakland and San Jose Termini**

	capacity for intercity and commuter travel and reduce existing automobile traffic. The fully grade-separated Caltrain corridor between Gilroy and San Jose, Niles/I-880 Alignment between Oakland and Union City would improve local traffic flow and reduce air pollution at existing rail crossings. There would also be some grade separation benefits in the UPRR in the I-580 corridor and UPRR N/S Alignment segments through the Central Valley. This network alternative would not provide direct HST service to San Francisco, SFO and the SF Peninsula/Caltrain Corridor between San Francisco and San Jose.
<b>Noise and Vibration:</b> <sup>i</sup> High, medium, or low potential impacts	Medium potential of noise impacts for the overall alternative. All segments have a medium potential for noise impacts, with the expectation of Henry Miller and Henry Miller UPRR Connection, which have a low potential of noise impacts. Medium to high potential of vibration impacts for the overall alternative. Medium potential of vibration impacts from San Jose to Niles Junction. High potential of vibration impacts from Oakland to Niles Junction. Medium potential of vibration impacts, from San Jose to Gilroy and Niles Junction to Tracy. The Central Valley has a low potential for vibration impacts.
<b>Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice</b>	<p>Compatibility: Majority of network alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way for most of the alignment. It exhibits low compatibility where it connects to the UPRR N/S in the Chowchilla area. It exhibits low compatibility where it does not follow a transportation right-of-way in the Altamont Pass area. It has a medium compatibility in the Lathrop, Manteca, Modesto and Merced areas.</p> <p>Environmental Justice: This network alternative has medium environmental justice impact rating for the East Bay Between Oakland and San Jose, for the Caltrain Corridor between San Jose and Gilroy, and a low impact rating between Gilroy and the Central Valley. It exhibits a low environmental justice impact rating for the UPRR alignment from Niles Canyon to the Central Valley, and a medium impact rating in the Central Valley, except in the Manteca area, where the rating is low.</p> <p>Community: This network alternative would not affect community cohesion, given that the majority of the alignment is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: This network alternative has the potential for high property impacts in the Niles Canyon and Manteca areas, where additional right-of-way would be required.</p>
<b>Aesthetics and Visual Resources:</b> General impacts and rating.	Segments visual ratings: (1) Oakland to Niles Junction =low; (2) Niles Junction to San Jose =medium; (3) Pacheco =medium; (4) Henry Miller to UPRR =low; (5) UPRR =medium; (6) Tracy Downtown =low; and (7) UPRR N/S =low. Overall network alternative rating is low to medium.
<b>Farmlands:</b> <sup>ii</sup> Ac (ha) potentially affected	<p>Farmland: 1,384.1 ac (560.14 ha)</p> <p>Impact up to 764.5 ac (309.39 ha) of prime farmland. The majority of potential farmland impacts would occur along the Tracy, Pacheco, Henry Miller and UPRR (North/South) segments. Overall, this network alternative along with the San Francisco, Oakland, and San Jose Termini (without Dumbarton Bridge), and San Jose Termini alternatives would have the greatest potential impact on farmland within the Pacheco Pass with Altamont (local service) network alternatives. The difference in overall farmland impacts within the Pacheco Pass with Altamont (local service) network alternatives is about 4 ac (1.62 ha).</p>



**Table 7.2-19**  
**Pacheco Pass with Altamont (Local Service): Oakland and San Jose Termini**

<b>Cultural Resources and Paleontological Resources:</b> <sup>iii</sup> Potential presence of historical resources in area of potential effect	There are 133 known cultural resources.  Historic properties and industrial complexes dating from the 1920s and 1940s are within the area of potential effects along with water delivery systems and canals dating from the 1890s, freeway bridges dating from the 1940s, and residential properties dating from the 1880s. Overall, this network alternative was identified as having a moderate sensitivity for cultural resources.
<b>Hydrology and Water Resources:</b> <sup>iv</sup> Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	Floodplains: 456.4 ac (184.7 ha) direct/ 1,633.2 ac (660.96 ha) indirect Streams: 27,666 linear ft (8,432.5 linear m) direct/ 132,501 linear ft (40,386.4 linear m) indirect Lakes/Waterbodies: 5.3 ac (2.14 ha) direct/ 18.92 ac (7.66 ha) indirect  Potentially affect Guadalupe River, Pajaro River, San Joaquin River, Stanislaus River, Tuolumne River, Merced River, and Chowchilla River as well as the Hetch Hetchy Aqueduct, South Bay Aqueduct, and California Aqueduct among other water resources. Several watercourses would be crossed more than once. Includes tunnels that would avoid impacts on the floodplain and above ground water resources, and aerial structures that would minimize impact on floodplains and streams, creeks, and channels.
<b>Biological Resources Including Wetlands</b> Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	Wetlands <sup>v</sup> : 25.3 ac (10.23 ha) direct/ 2,180 ac (882.4 ha) indirect Non-Wetland Waters: 17,977 linear ft (5,479.3 linear m) Species: 67 special-status plant and 51 special-status wildlife species  Potentially significant impacts on special-status plant and wildlife species, wetlands, and waters.  Network alternative would be along existing transportation corridors with some portions in new rail corridors. Potentially result in a barrier to the movement of wildlife in areas where it severs wildlife movement corridors. Conflict with conservation and restoration plans and special management areas, such as the GEA. The placement of the alignment and stations and use of tunnels and aerial structures would minimize impacts on biological resources.
<b>Fault Crossings</b>	Hayward (Active) – At Grade - Adjacent and Parallel Hayward (Active) – At Grade Silver Creek (Potentially Active) – Above Grade Silver Creek (Potentially Active) – At Grade Calaveras (Active) – At Grade Ortigalita (Active) – At Grade Calaveras (Active) – Tunnel Livermore (Potentially Active) – Above Grade Greenville (Active) – Above Grade Vernalis (Active) – At Grade
<b>Section 4(f) and 6(f) Resources:</b> <sup>4</sup> Number of resources rated high potential direct effects	There are 36 public parks, recreation lands, wildlife and waterfowl refuges that are 0–150 ft (46 m) from center of the network alternative. Few potential direct impacts are anticipated given that much of the network alternatives is within or directly adjacent to existing transportation rights-of-way, and few resources exist in areas where the network alternative is not adjacent to or within this existing right-of-way. Exceptions include the Augustin-Bernal Park.

## C. SAN FRANCISCO, OAKLAND, AND SAN JOSE TERMINI (WITHOUT DUMBARTON BRIDGE)

This network alternative is shown in Figure 7.2-20 and described in Table 7.2-20. The segments used for this representative alternative are Caltrain (SF – Dumbarton), Caltrain (Dumbarton – San Jose), Niles/I-880 (West Oakland to Niles Junction), Niles/I-880 (Niles Junction to San Jose via I-880), East Bay Connections (Dumbarton/Niles XN & Dumbarton/Niles XS), UPRR (Niles to Altamont)<sup>18</sup>, Tracy Downtown (UPRR Connection)<sup>19</sup>, Pacheco (San Jose to Western Valley), Henry Miller (Western Valley to BNSF/UPRR), Henry Miller UPRR Connection, UPRR (Central Valley).

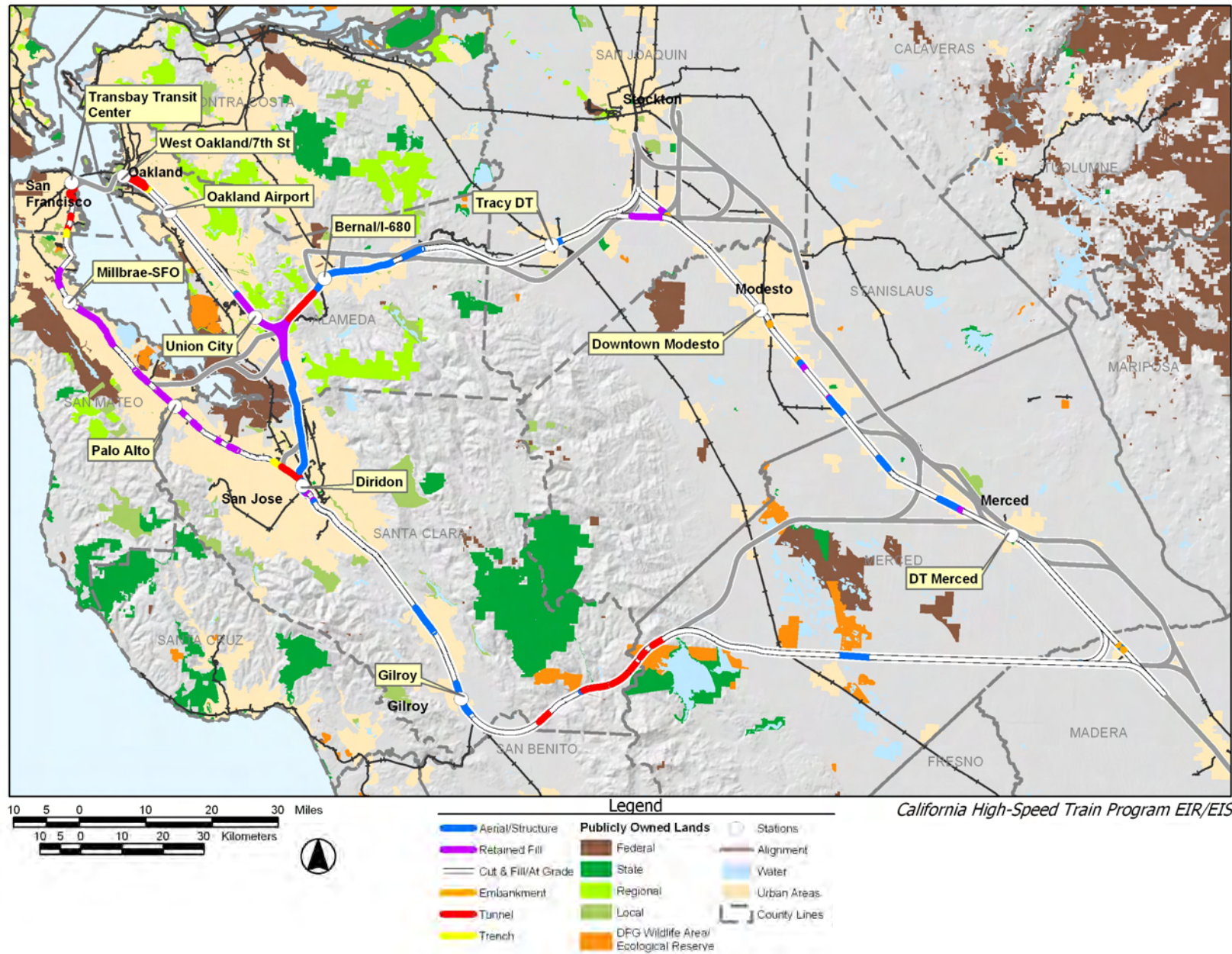
**Table 7.2-20**  
**Pacheco Pass with Altamont Pass (Local Service): SF, Oak, and SJ Termini (without Dumbarton Bridge)**

Physical/Operational Characteristics	
<b>Network Alternative Description</b>	From Oakland to San Jose, this network alternative would use the Niles/I-880 Alignment. From San Francisco to San Jose, this network alternative would use the existing Caltrain right-of-way. From San Jose, this network alternative would use the Pacheco and Henry Miller (to the UPRR) Alignment Alternatives and the UPRR N/S Alignment in the Central Valley. The UPRR Alignment through Downtown Tracy would be used for the Altamont Pass. Station location options considered for this alternative are West Oakland/7 <sup>th</sup> Street, Coliseum/Airport, Union City (BART), Transbay Transit Center, Millbrae/SFO, Palo Alto (Caltrain), San Jose (Diridon), Gilroy (Caltrain), Merced (Downtown), and Modesto (Downtown). Local HST Stations would be at Pleasanton (I-680/Bernal Road), and Tracy (Downtown).
<b>Length</b>	360.90 mi (580.81 km)
<b>Cost (dollars)</b>	\$20.4 billion
<b>Express Travel Times (minutes)<sup>20</sup></b>	<p>Altamont</p> <p>SF–LA=3:26; Oakland–LA=2:30; SJ–LA=2:26; SF–Sac=1:48; Oakland–Sac=1:00; SJ–Sac=0:56; SF–Fresno=2:03; Oakland–Fresno=1:11; SJ–Fresno=1:08 ; Pleasanton–LA=2:13; Tracy–LA=1:59; SF–Tracy=1:36; Oakland–Tracy=0:36; SJ–Tracy=0:27</p> <p>Pacheco</p> <p>SF–LA=2:38; Oakland–LA=2:30; SJ–LA=2:09; SF–Sac=1:47; Oakland–Sac=1:38; SJ–Sac=1:18; SF–Fresno=1:20; Oakland–Fresno=1:12; SJ–Fresno=0:51; Gilroy–LA=1:57; SF–Gilroy=0:44; Oakland–Gilroy=0:36; SJ–Gilroy=0:15</p>

<sup>18</sup> Does not include “express tracks” through Pleasanton Station.

<sup>19</sup> Does not include “express tracks” through Tracy Downtown Station.

<sup>20</sup> The travel times for any train traveling to or from San Francisco for this alternative must include a turn around time of no less than 20 minutes at the San Jose station.



**Figure 7.2-20**  
**Network Alternatives**  
**Pacheco Pass with Altamont (Local Service)**  
**San Francisco, Oakland, and San Jose Termini (without Dumbarton Bridge)**



**Table 7.2-20**  
**Pacheco Pass with Altamont Pass (Local Service): SF, Oak, and SJ Termini (without Dumbarton Bridge)**

<b>Ridership</b>	This network alternative would directly serve downtown Oakland and Oakland International Airport, downtown San Francisco, the San Francisco International Airport, the Peninsula, San Jose, south Santa Clara County and the Central Valley. Total ridership for the statewide HST system with this network alternative is forecast to be about 6.5% less than the Pacheco "Base Case" alternative, or at 87.8 million passengers per year by 2030. Revenue is estimated at \$2.9 billion per year by 2030. Although this option serves additional markets than the Pacheco Base Case Alternative, the drop in system ridership is a result of the splitting of service between the San Francisco Peninsula, Oakland, and San Jose. Additional frequency of service (along with higher operational costs) would be needed to increase ridership for this network alternative.
<b>Constructability</b>	Portions of this network alternative are aligned in or along existing passenger rail lines and highways. Maintaining operations on the existing passenger rail service and automobile traffic while constructing grade separations, tunnels, elevated sections, and stations would involve major construction issues/challenges. However, the HST infrastructure could be constructed incrementally to minimize impact to existing operations.
<b>O &amp; M Cost (dollars per year)</b>	\$1,179 million
<b>Operational Issues</b>	<p>Altamont</p> <p>Average Speed</p> <p>SF–LA=138.6 mph (223.6 kph); Oakland–LA=173.6 mph (280.0 kph); SJ–LA=176.0 mph (284.0 kph); SF–Sac=96.4 mph (155.6 kph); Oakland–Sac=132.1 mph (213.0 kph); SJ–Sac=135.3 mph (218.3 kph); SF–Fresno=120.4 mph (194.1 kph); Oakland–Fresno=152.4 mph (245.8 kph); SJ–Fresno=153.6 mph (247.8 kph); Pleasanton–LA=181.3 mph (292.3 kph); Tracy–LA=183.4 mph (305.7 kph); SF–Tracy=62.4 mph (100.6 kph); Oakland–Tracy=97.1 mph (156.7 kph); SJ–Tracy=115.7 mph (186.7 kph)</p> <p>Maximum Speed</p> <p>SF–LA=210 mph (350 kph); Oakland–LA=210 mph (350 kph); SJ–LA=210 mph (350 kph); SF–Sac=198 mph (330 kph); Oakland–Sac=198 mph (330 kph); SJ–Sac=198 mph (330 kph); SF–Fresno=210 mph (350 kph); Oakland–Fresno=210 mph (350 kph); SJ–Fresno=210 mph (350 kph); Livermore–LA=210 mph (350 kph); Tracy–LA=210 mph (350 kph); SF–Tracy=178.2 mph (297 kph); Oakland–Tracy=178.2 mph (297 kph); SJ–Tracy=180 mph (300 kph)</p> <p>Pacheco</p> <p>Average Speed</p> <p>SF–LA=164.2 mph (273.6 kph); Oakland–LA=170.7 mph (284.6 kph); SJ–LA=179.5 mph (299.2 kph); SF–Sac=152.8 mph (254.7 kph); Oakland–Sac=163.5 mph (272.6 kph); SJ–Sac=174 mph (290 kph); SF–Fresno=139.5 mph (232.5 kph); Oakland–Fresno=150.5 mph (250.8 kph); SJ–Fresno=164.3 mph (273.8 kph); Gilroy–LA=183.2 mph (305.4 kph); SF–Gilroy=102.3 mph (170.6 kph); Oakland–Gilroy=116 mph (193.3 kph); SJ–Gilroy=114.6 mph (191 kph)</p> <p>Maximum Speed</p> <p>SF–LA=210 mph (350 kph); Oakland–LA=210 mph (350 kph); SJ–LA=210 mph (350 kph); SF–Sac=210 mph (350 kph); Oakland–Sac=210 mph (350 kph); SJ–Sac=210 mph (350 kph); SF–Fresno=210 mph (350 kph); Oakland–Fresno=210 mph (350 kph); SJ–Fresno=210 mph (350 kph); Gilroy–LA=210 mph (350 kph); SF–Gilroy=180 mph (300 kph); Oakland–Gilroy=180 mph (300 kph); SJ–Gilroy=180 mph (300 kph)</p>



**Table 7.2-20**  
**Pacheco Pass with Altamont Pass (Local Service): SF, Oak, and SJ Termini (without Dumbarton Bridge)**

	HST operations would need to be coordinated and integrated with Caltrain service and ACE service. Using both the Pacheco and Altamont alignment alternatives to serve the Bay Area provides greater capacity, operating flexibility, and reliability (in terms of redundancy). In order to serve the additional markets, more train operations would be necessary.
<b>Potential Environmental Impacts</b>	
<b>Travel Conditions</b>	The Caltrain corridor Alignment would bring direct HST service up the San Francisco Peninsula to downtown San Francisco with potential stations in downtown San Francisco, at SFO (Millbrae), a mid-Peninsula station at Palo Alto, and a San Jose Station (Diridon). HST service would be provided to Southern Santa Clara County at a Gilroy Station, with service to the Central Valley at Merced and Modesto. The network alternative would provide direct service to Oakland with a station in West Oakland, to the Oakland International Airport with a Coliseum/BART station, and to a Union City (BART) Station. The Altamont Pass would use the UPRR Alignment with local HST stations at Pleasanton (I-680/Bernal), and downtown Tracy. This network alternative would increase connectivity and accessibility to San Francisco, the Peninsula and SFO, the hub international airport for northern California, Oakland, the Oakland International Airport (Coliseum/BART), southern Alameda County, San Jose, Southern Santa Clara County and Monterey/ Santa Cruz/ Salinas area, the I-580 Corridor and Tri-Valley area, and the Central Valley. The Gilroy station would be the closest HST station for Monterey, Santa Cruz, and San Benito counties. The HST Network Alternative would provide a safer, more reliable, energy-efficient intercity mode along the East Bay while improving the safety, reliability, and performance of the regional commuter service, particularly along the Altamont Pass Alignment. The HST Network Alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic. The fully grade-separated Caltrain corridor north of Gilroy, Niles/I-880 Alignment between Oakland and Union City would improve local traffic flow and reduce air pollution at existing rail crossings. There would also be some grade separation benefits in the UPRR in the I-580 corridor and UPRR N/S Alignment segments through the Central Valley.
<b>Noise and Vibration:</b> <sup>i</sup> High, medium, or low potential impacts	Medium potential of noise impacts for the overall alternative. All segments have a medium potential for noise impacts, with the expectation of Henry Miller and Henry Miller UPRR Connection, which have a low potential of noise impacts. Medium to high potential of vibration impacts for the overall alternative. Medium potential of vibration impacts from San Francisco to Dumbarton. High potential of vibration impacts from Dumbarton to San Jose. Medium potential of vibration impacts from San Jose to Niles Junction. High potential of vibration impacts from Oakland to Niles Junction. Medium potential of vibration impacts, from San Jose to Gilroy and Niles Junction to Tracy. The Central Valley has a low potential for vibration impacts.
<b>Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice</b>	<p>Compatibility: Majority of network alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way for most of the alignment. It exhibits low compatibility where it connects to the UPRR N/S in the Chowchilla area. It exhibits low compatibility where it does not follow a transportation right-of-way in the Altamont Pass area. It has a medium compatibility in the Lathrop, Manteca, Modesto and Merced areas.</p> <p>Environmental Justice: This network alternative has medium environmental justice impact rating for the East Bay Between Oakland and San Jose and for the Caltrain Corridor between San Francisco and Gilroy. It has a low impact</p>

**Table 7.2-20**  
**Pacheco Pass with Altamont Pass (Local Service): SF, Oak, and SJ Termini (without Dumbarton Bridge)**

	<p>rating between Gilroy and the Central Valley. It exhibits a low environmental justice impact rating for the UPRR alignment from Niles Canyon to the Central Valley, and a medium impact rating in the Central Valley, except in the Manteca area, where the rating is low.</p> <p>Community: This network alternative would not affect community cohesion, given that the majority of the alignment is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: This network alternative has the potential for high property impacts in the Niles Canyon and Manteca areas, where additional right-of-way would be required.</p>
<b>Aesthetics and Visual Resources:</b> General impacts and rating.	<p>Segments visual ratings: (1) Caltrain – San Francisco to Dumbarton =low; (2) Caltrain – Dumbarton to San Jose =low; (3) Oakland to Niles Junction =low; (4) Niles Junction to San Jose =medium; (5) Pacheco =medium; (6) Henry Miller to UPRR =low; (7) UPRR =medium; (8) Tracy Downtown =low; and (9) UPRR N/S =low. Overall network alternative rating is low to medium.</p>
<b>Farmlands:</b> <sup>ii</sup> Ac (ha) potentially affected	<p>Farmland: 1,384.1 ac (560.14 ha)</p> <p>Impact up to 764.5 ac (309.39 ha) of prime farmland. The majority of potential farmland impacts would occur along the Tracy, Pacheco, Henry Miller and UPRR (North/South) segments. Overall, this network alternative along with the Oakland and San Jose Termini and San Jose Termini alternatives would have the greatest potential impact on farmland within the Pacheco Pass with Altamont (local service) network alternatives.</p>
<b>Cultural Resources and Paleontological Resources:</b> <sup>iii</sup> Potential presence of historical resources in area of potential effect	<p>There are 222 known cultural resources.</p> <p>Of the Pacheco Pass with Altamont (local service) network alternatives, this network alternative was identified to have the highest number of known resources.</p> <p>This network alternative extends through numerous historic districts in San Francisco. Historic properties and buildings dating from the 1900s are within the area of potential effects along with industrial complexes dating from the 1920s to 1940s, water delivery systems and canals dating from the 1890s, railroad facilities, freeway bridges dating from the 1940s, and residential properties dating from the 1880s. Overall, this network alternative was identified as having a high sensitivity for cultural resources.</p>
<b>Hydrology and Water Resources:</b> <sup>iv</sup> Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	<p>Floodplains: 552.2 ac (223.49 ha) direct/ 1,685.1 ac (691.98 ha) indirect</p> <p>Streams: 30,278 linear ft (9,228.9 linear m) direct/ 137,768 linear ft (41,191.56 linear m) indirect</p> <p>Lakes/Waterbodies: 5.3 ac (2.14 ha) direct/ 22.3 ac (9.02 ha) indirect</p> <p>Of the Pacheco Pass with Altamont Pass (local service) network alternatives, this network alternative was identified to have the highest impact on waters including streams, rivers, and canals as well as floodplains, groundwater, and impaired waters. This network alternative was also identified as having the potential to encounter the most erosive soils.</p> <p>Potentially affect Guadalupe River, Pajaro River, San Joaquin River, Stanislaus River, Tuolumne River, Merced River, and Chowchilla River as well as the Hetch Hetchy Aqueduct, South Bay Aqueduct, and California Aqueduct among other water resources. Several watercourses would be crossed more than once. Includes tunnels that would avoid impacts on the floodplain and above ground water resources, and aerial structures that would minimize impact on</p>

**Table 7.2-20**  
**Pacheco Pass with Altamont Pass (Local Service): SF, Oak, and SJ Termini (without Dumbarton Bridge)**

	floodplains and streams, creeks, and channels..
<b>Biological Resources Including Wetlands</b> Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	<p>Wetlands<sup>v</sup>: 25.4 ac (10.26 ha) direct/ 2,332 ac (943.9 ha) indirect</p> <p>Non-Wetland Waters: 18,556 linear ft (5,659.1 linear m)</p> <p>Species: 71 special-status plant and 58 special-status wildlife species</p> <p>Of the Pacheco Pass with Altamont Pass (local service) network alternatives, this network alternative would have the potential to impact the most special-status plant and wildlife species. Potentially significant impacts on special-status plant and wildlife species, wetlands, and waters.</p> <p>Network alternative would be along existing transportation corridors with some portions in new rail corridors. Potentially result in a barrier to the movement of wildlife in areas where it severs wildlife movement corridors. Conflict with conservation and restoration plans and special management areas, such as the GEA. The placement of the alignment and stations and use of tunnels and aerial structures would minimize impacts on biological resources.</p>
<b>Fault Crossings</b>	<p>San Bruno (Potentially Active) – At Grade</p> <p>Buried Trace of Unnamed Fault (Potentially Active) – At Grade</p> <p>Hayward (Active) – At Grade - Adjacent and Parallel</p> <p>Hayward (Active) – At Grade</p> <p>Silver Creek (Potentially Active) – Above Grade</p> <p>Silver Creek (Potentially Active) – At Grade</p> <p>Calaveras (Active) – At Grade</p> <p>Ortigalita (Active) – At Grade</p> <p>Calaveras (Active) – Tunnel</p> <p>Livermore (Potentially Active) – Above Grade</p> <p>Greenville (Active) – Above Grade</p> <p>Vernalis (Active) – At Grade</p>
<b>Section 4(f) and 6(f) Resources:</b> <sup>4</sup> Number of resources rated high potential direct effects	There are 46 public parks, recreation lands, wildlife and waterfowl refuges that are 0–150 ft (46 m) from center of the network alternative. Few potential direct impacts are anticipated given that much of the network alternatives is within or directly adjacent to existing transportation rights-of-way, and few resources exist in areas where the network alternative is not adjacent to or within this existing right-of-way. Exceptions include the Augustin-Bernal Park.

## D. SAN JOSE TERMINUS

This network alternative is shown in Figure 7.2-21 and described in Table 7.2-21. The segments used for this representative alternative are Niles/I-880 (Niles Junction to San Jose via I-880)<sup>21</sup>, East Bay Connection (Dumbarton/Niles XS), UPRR (Niles to Altamont)<sup>22</sup>, Tracy Downtown (UPRR Connection)<sup>23</sup>, Pacheco (San Jose to Western Valley), Henry Miller (Western Valley to BNSF/UPRR), Henry Miller UPRR Connection, UPRR (Central Valley).

**Table 7.2-21**  
**Pacheco Pass with Altamont Pass (Local Service): San Jose Terminus**

<b>Physical/Operational Characteristics</b>	
<b>Network Alternative Description</b>	From San Jose, this network alternative would use the Pacheco and Henry Miller (to the UPRR) Alignment Alternatives and the UPRR N/S Alignment in the Central Valley. The Altamont Pass would use the UPRR Alignment through downtown Tracy. Station location options considered for this alternative are San Jose (Diridon), Gilroy (Caltrain), Merced (Downtown), and Modesto (Downtown). Local HST stations would be at Warm Springs (BART), Pleasanton (I-680/Bernal), and downtown Tracy.
<b>Length</b>	286.04 mi (460.34 km)
<b>Cost (dollars)</b>	\$13.5 billion
<b>Express Travel Times (minutes)</b>	Altamont SJ-LA=2:26; SJ-Sac=0:56; SJ-Fresno=1:08; Pleasanton-LA=2:13; Tracy-LA=1:59; SJ-Tracy=0:27  Pacheco SJ-LA=2:09; SJ-Sac=1:18; SJ-Fresno=0:51; Gilroy-LA=1:57; SJ-Gilroy=0:15
<b>Ridership</b>	This network alternative would directly serve downtown San Jose, Southern Santa Clara County, and the Central Valley. Total ridership for the statewide HST system with this network alternative is forecast to be about 4.2% less than the Pacheco "Base Case" alternative, or at 89.8 million passengers per year by 2030. Revenue is estimated at \$2.96 billion per year by 2030.
<b>Constructability</b>	Portions of this network alternative are aligned in or along existing passenger rail lines and highways. Maintaining operations on the existing passenger rail service and automobile traffic while constructing grade separations, tunnels, elevated sections, and stations would involve major construction issues/challenges. However, the HST infrastructure could be constructed incrementally to minimize impact to existing operations.
<b>O &amp; M Cost (dollars per year)</b>	\$1,130 million

<sup>21</sup> Does not include Niles Junction to Niles Wye S ("Niles/I-880 5A") segment.

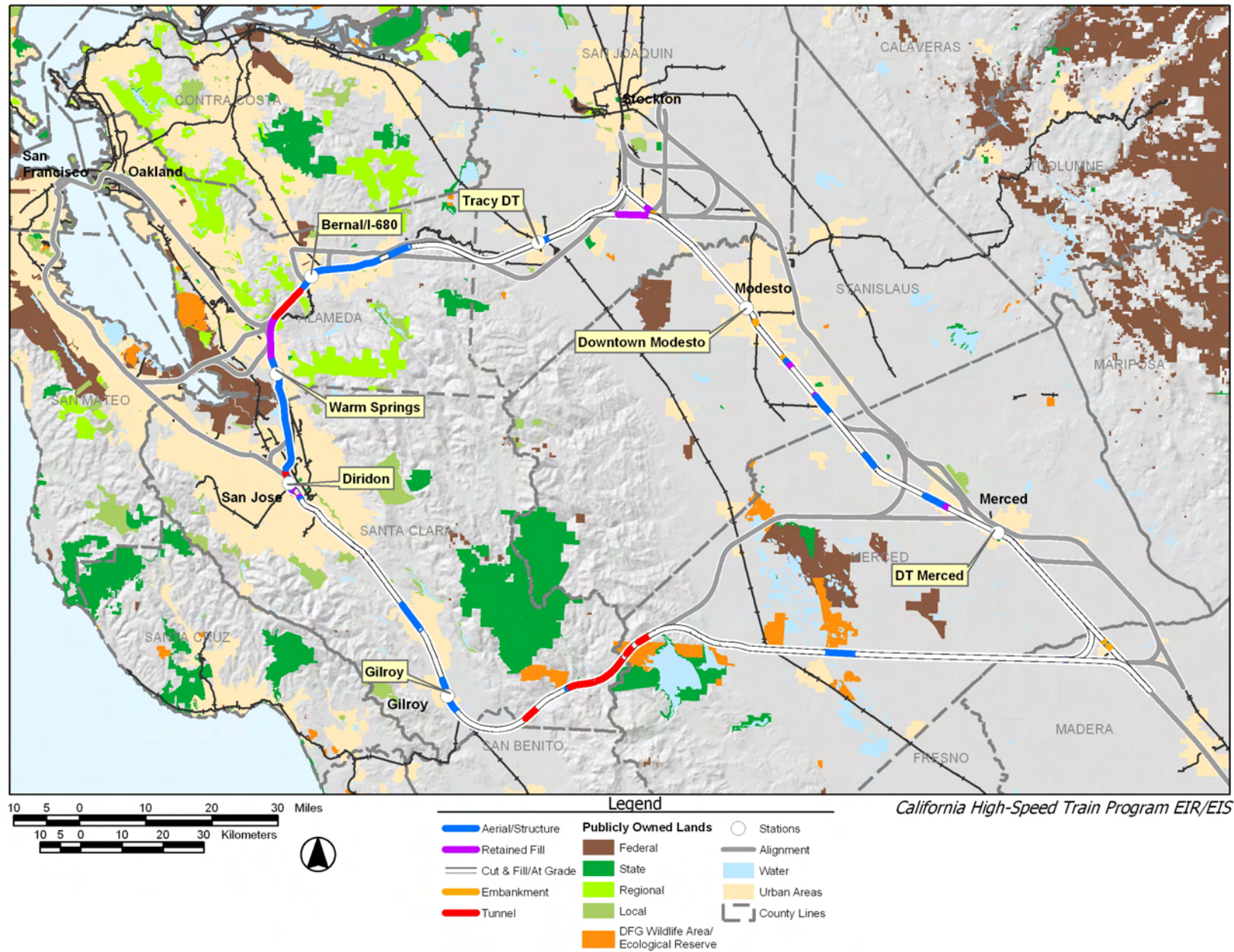
<sup>22</sup> Does not include "express tracks" through Pleasanton Station.

<sup>23</sup> Does not include "express tracks" through Tracy Downtown Station.

**Table 7.2-21  
Pacheco Pass with Altamont Pass (Local Service): San Jose Terminus**

<b>Operational Issues</b>	<p>Altamont</p> <p>Average Speed</p> <p>SJ–LA=176.0 mph (284.0 kph); SJ–Sac=135.3_ mph (218.3 kph); SJ–Fresno=153.6 mph (247.8 kph); Pleasanton–LA=181.3 mph (292.3 kph); Tracy–LA=183.4 mph (305.7 kph); SJ–Tracy=115.7 mph (186.7 kph)</p> <p>Maximum Speed</p> <p>SJ–LA=210 mph (350 kph); SJ–Sac=198 mph (330 kph); SJ–Fresno=210 mph (350 kph); Livermore–LA=210 mph (350 kph); Tracy–LA=210 mph (350 kph); SJ–Tracy=180 mph (300 kph)</p> <p>Pacheco</p> <p>Average Speed</p> <p>SJ–LA=179.5 mph (299.2 kph); SJ–Sac=174 mph (290 kph); SJ–Fresno=164.3 mph (273.8 kph); Gilroy–LA=183.2 mph (305.4 kph); SJ–Gilroy=114.6 mph (191 kph)</p> <p>Maximum Speed</p> <p>SJ–LA=210 mph (350 kph); SJ–Sac=210_ mph (350 kph); SJ–Fresno=210 mph (350 kph); Gilroy–LA=210 mph (350 kph); SJ–Gilroy=180mph (300 kph)</p> <p>Using both the Pacheco and Altamont alignment alternatives to serve the Bay Area provides greater capacity, operating flexibility, and reliability (in terms of redundancy). In order to serve the additional markets, more train operations would be necessary. HST operations would need to be coordinated and integrated with Caltrain service between San Jose and Gilroy, ACE service and all transportation services at San Jose.</p>
<b>Potential Environmental Impacts</b>	
<b>Travel Conditions</b>	<p>This network alternative would provide direct HST service to San Jose (Diridon), Southern Santa Clara county with a station in Gilroy, and the Central Valley with Stations in Merced and Modesto. This network alternative would increase connectivity and accessibility to southern Alameda County, San Jose, Southern Santa Clara County and Monterey/ Santa Cruz/ Salinas area, the I-580 Corridor and Tri-Valley area, and the Central Valley. The Gilroy station would be the closest HST station for Monterey, Santa Cruz, and San Benito counties. The HST Network Alternative would provide a safer, more reliable, energy-efficient intercity mode in Santa Clara County and the Central Valley while improving the safety, reliability, and performance of the regional commuter service. The HST Network Alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic. The fully grade-separated Caltrain corridor between Gilroy and San Jose would improve local traffic flow and reduce air pollution at existing rail crossings. There would also be grade separation benefits in the UPRR in the I-580 corridor and UPRR N/S Alignment through the Central Valley. This network alternative would not provide direct HST service to San Francisco, SFO, the SF Peninsula/Caltrain Corridor between San Francisco and San Jose, Oakland, and Oakland Airport.</p>





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**Figure 7.2-21**  
**Network Alternatives**  
**Pacheco Pass with Altamont (Local Service)**  
**San Jose Terminus**



**Table 7.2-21**  
**Pacheco Pass with Altamont Pass (Local Service): San Jose Terminus**

<b>Noise and Vibration:</b> <sup>i</sup> High, medium, or low potential impacts	Medium potential of noise impacts for the overall alternative. All segments have a medium potential for noise impacts, with the expectation of Henry Miller and Henry Miller UPRR Connection, which have a low potential of noise impacts. Medium to high potential of vibration impacts for the overall alternative. Medium potential of vibration impacts from San Jose to Tracy and from San Jose to Gilroy. The Central Valley has a low potential for vibration impacts.
<b>Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice</b>	<p>Compatibility: Majority of network alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way for most of the alignment. It exhibits low compatibility where it connects to the UPRR N/S in the Chowchilla area. It exhibits low compatibility where it does not follow a transportation right-of-way in the Altamont Pass area. It has a medium compatibility in the Lathrop, Manteca, Modesto and Merced areas.</p> <p>Environmental Justice: This network alternative has medium environmental justice impact rating for the East Bay Between Niles Junction and San Jose and for the Caltrain Corridor between San Francisco and Gilroy. It has a low impact rating between Gilroy and the Central Valley. It exhibits a low environmental justice impact rating for the UPRR alignment from Niles Canyon to the Central Valley, and a medium impact rating in the Central Valley, except in the Manteca area, where the rating is low.</p> <p>Community: This network alternative would not affect community cohesion, given that the majority of the alignment is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: This network alternative has the potential for high property impacts in the Niles Canyon and Manteca areas, where additional right-of-way would be required.</p>
<b>Aesthetics and Visual Resources:</b> General impacts and rating.	Segments visual ratings: (1) Niles Junction to San Jose =medium; (2) Pacheco =medium; (3) Henry Miller to UPRR =low; (4) UPRR =medium; (5) Tracy Downtown =low; and (6) UPRR N/S =low. Overall network alternative rating is low to medium.
<b>Farmlands:</b> <sup>ii</sup> Ac (ha) potentially affected	<p>Farmland: 1,384.1 ac (560.14 ha)</p> <p>Impact up to 764.5 ac (309.39 ha) of prime farmland. The majority of potential farmland impacts would occur along the Tracy, Pacheco, Henry Miller and UPRR (North/South) segments. Overall, this network alternative along with the Oakland and San Jose Termini and San Francisco, Oakland, and San Jose Termini (without Dumbarton Bridge) alternatives would have the greatest potential impact on farmland within the Pacheco Pass with Altamont (local service) network alternatives.</p>
<b>Cultural Resources and Paleontological Resources:</b> <sup>iii</sup> Potential presence of historical resources in area of potential effect	<p>There are 109 known cultural resources.</p> <p>Of the Pacheco Pass with Altamont (local service) network alternatives, this network alternative was identified to have the least number of known resources.</p> <p>Historic properties and buildings dating from the 1920s are within the area of potential effects along with water delivery systems and canals dating from the 1890s, freeway bridges dating from the 1940s, and residential properties dating from the 1890s. Overall, this network alternative was identified as having a low sensitivity for cultural resources.</p>

**Table 7.2-21**  
**Pacheco Pass with Altamont Pass (Local Service): San Jose Terminus**

<p><b>Hydrology and Water Resources:</b><sup>iv</sup>  Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.</p>	<p>Floodplains: 432.2 ac (174.91 ha) direct/ 1,479.1 ac (598.58 ha) indirect  Streams: 24,197 linear ft (7,375.2 linear m) direct/ 120,049 linear ft (36,591 linear m) indirect  Lakes/Waterbodies: 4.6 ac (1.87 ha) direct/ 17.6 ac (7.13 ha) indirect  Of the Pacheco Pass with Altamont Pass (local service) network alternatives, this network alternative was identified to have the least impact on water resources.  Potentially affect Guadalupe River, Pajaro River, San Joaquin River, Stanislaus River, Tuolumne River, Merced River, and Chowchilla River as well as the Hetch Hetchy Aqueduct, South Bay Aqueduct, and California Aqueduct among other water resources. Several watercourses would be crossed more than once. Includes tunnels that would avoid impacts on the floodplain and above ground water resources, and aerial structures that would minimize impact on floodplains and streams, creeks, and channels.</p>
<p><b>Biological Resources Including Wetlands</b> Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas</p>	<p>Wetlands<sup>v</sup>: 23.7 ac (9.58 ha) direct/ 1,972 ac (798.0 ha) indirect  Non-Wetland Waters: 17,521 linear ft (5,340.5 linear m)  Species: 54 special-status plant and 50 special-status wildlife species  Of the Pacheco Pass with Altamont Pass (local service) network alternatives, this network alternative would have the potential to impact the least special-status plant and wildlife species, wetlands, and waters. Potentially significant impacts on special-status plant and wildlife species, wetlands, and waters.  Network alternative would be along existing transportation corridors with some portions in new rail corridors. Potentially result in a barrier to the movement of wildlife in areas where it severs wildlife movement corridors. Conflict with conservation and restoration plans and special management areas, such as the GEA. The placement of the alignment and stations and use of tunnels and aerial structures would minimize impacts on biological resources.</p>
<p><b>Fault Crossings</b></p>	<p>Hayward (Active) – At Grade  Silver Creek (Potentially Active) – Above Grade  Silver Creek (Potentially Active) – At Grade  Calaveras (Active) – At Grade  Ortigalita (Active) – At Grade  Calaveras (Active) – Tunnel  Livermore (Potentially Active) – Above Grade  Greenville (Active) – Above Grade  Vernalis (Active) – At Grade</p>
<p><b>Section 4(f) and 6(f) Resources:</b><sup>4</sup>  Number of resources rated high potential direct effects</p>	<p>There are 27 public parks, recreation lands, wildlife and waterfowl refuges that are 0–150 ft (46 m) from center of the network alternative. Few potential direct impacts are anticipated given that much of the network alternatives is within or directly adjacent to existing transportation rights-of-way, and few resources exist in areas where the network alternative is not adjacent to or within this existing right-of-way. Exceptions include the Augustin-Bernal Park.</p>

### 7.3 Alignment Alternatives

The HST Alignment Alternatives are general locations for HST tracks, structures, and systems for the HST system between logical points within study corridors; they are generally configured along or adjacent to existing rail transportation facilities. These HST Alignment Alternatives are described in Chapter 2, analyzed in Chapter 3, and compared and used to create the HST Networks Alternatives.

To facilitate the alignment alternative analysis, the study area was divided into six corridors within the study region:

- San Francisco to San Jose.
- Oakland to San Jose.
- San Jose to Central Valley.
- East Bay to Central Valley.
- San Francisco Bay Crossings.
- Central Valley Alignment.

These corridors connect different parts of the study region and are fundamentally different and distinct in terms of land use, terrain, and construction configuration (mix of at-grade, aerial structure, and tunnel sections). The HST Alignment Alternatives and station location options considered in each corridor of the study region are discussed below. The analyses in Chapter 3 under Affected Environment, Environmental Consequences, and Mitigation Strategies compile and report information about the affected environment and environmental consequences for each alignment alternative and segment as outlined in the tables. The purpose of this chapter is to summarize and compare the physical and operational characteristics and potential environmental consequences associated with the HST Network Alternatives and for the various HST alignment alternatives within the six corridors. The HST Alignment Alternatives and station location options are described below.

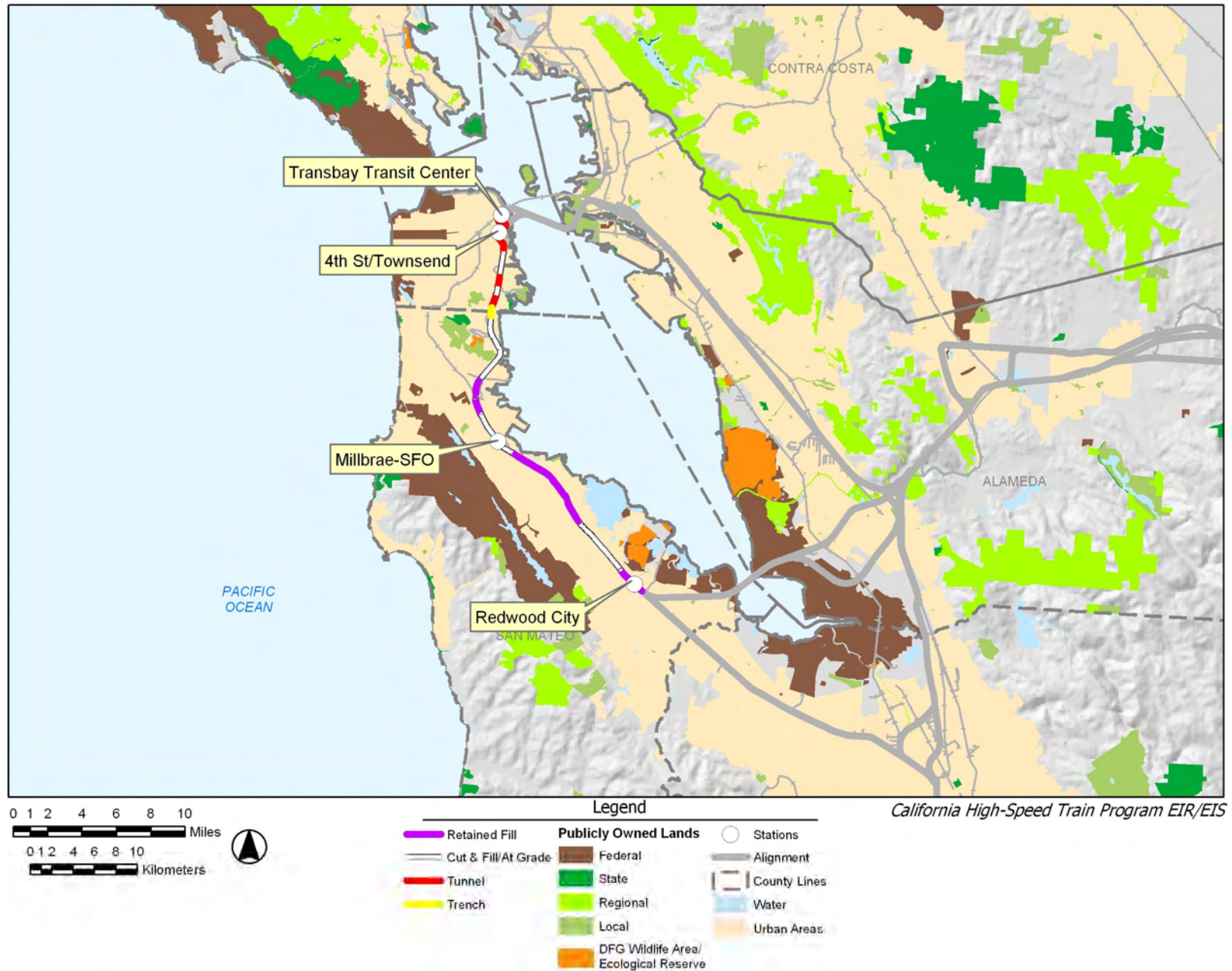


## A. CALTRAIN (SAN FRANCISCO TO DUMBARTON)

This alignment alternative is shown in Figure 7.3-1 and described in Table 7.3-1.

**Table 7.3-1**  
**Caltrain: San Francisco to Dumbarton**

<b>Physical/Operational Characteristics</b>	
<b>Alignment Alternative Description</b>	From San Francisco to Dumbarton, this alignment would use the existing Caltrain rail right-of-way. Station location options considered for this alternative are Transbay Transit Center or 4 <sup>th</sup> and King, Millbrae/SFO, Redwood City (Caltrain).
<b>Length</b>	27.70 mi (44.58 km)
<b>Cost (dollars)</b>	\$3.08 billion
<b>Express Travel Times</b>	20 minutes SF–Dumbarton (Transbay to Redwood City Station)
<b>Ridership</b>	This alignment would directly serve downtown San Francisco and San Francisco International Airport (SFO).
<b>Constructability</b>	Maintaining operations on the existing commuter rail service while constructing grade separations, tunnels, elevated sections, and stations would involve major construction issues/challenges. However, the infrastructure improvements could be constructed incrementally.
<b>Operational Issues</b>	Average speed = 76.6 mph (127.5 kph) Maximum speed = 120 mph (200 kph) HST operations would need to be coordinated and integrated with Caltrain service.
<b>Potential Environmental Impacts</b>	
<b>Travel Conditions</b>	The Caltrain corridor alignment alternative would bring direct HST service up the San Francisco Peninsula from Redwood City to downtown San Francisco with potential stations in downtown San Francisco, at SFO (Millbrae), and a mid-Peninsula station at Redwood City. This alignment alternative would increase connectivity and accessibility to San Francisco, the Peninsula, and SFO, the hub international airport for northern California. This alignment alternative would provide a safer, more reliable, energy-efficient intercity mode along the San Francisco Peninsula while improving the safety, reliability, and performance of the regional commuter service. It would also greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic. The fully grade-separated Caltrain corridor north of Redwood City would improve local traffic flow and reduce air pollution at existing rail crossings.
<b>Noise and Vibration:</b> <sup>i</sup> High, medium, or low potential impacts	Medium potential of noise impacts and medium potential of vibration impacts. Dense urban area surrounding land uses.  There would be an increase in noise levels due to increased frequency of trains. There would be a reduction in noise levels due to the elimination of horn noise and gate noise from existing services as a result of the grade separations at existing grade crossings.
<b>Land Use and Planning, Communities and Neighborhoods,</b>	Compatibility: The majority of this alignment alternative is compatible (high rating), given that it is within or



**Figure 7.3-1**  
**HST Alignment Alternatives**  
**Caltrain (San Francisco to Dumbarton)**



**Table 7.3-1  
Caltrain: San Francisco to Dumbarton**

<b>Property, and Environmental Justice</b>	<p>immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Environmental Justice: This alignment alternative has medium environmental justice impact rating for the Caltrain Corridor north of Dumbarton.</p> <p>Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: This alignment alternative has the potential for high property impacts in the 4<sup>th</sup> and Townsend to Millbrae segment.</p>
<b>Aesthetics and Visual Resources:</b> General impacts and rating.	Includes two additional tracks, pedestrian overcrossings and undercrossing at stations, and a raised Caltrain right-of-way. Overall low visual impact
<b>Cultural Resources and Paleontological Resources:</b> <sup>iii</sup> Potential presence of historical resources in area of potential effect	<p>There are 51 known cultural resources.</p> <p>The alignment alternative extends through numerous historic districts between Transbay Terminal and Millbrae/SFO. The alignment alternative also includes a number of historic buildings and archaeological resources.</p>
<b>Hydrology and Water Resources:</b> <sup>iv</sup> Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	<p>Floodplains: 49.3 ac (19.95 ha) direct/ 101.2 ac (40.96 ha) indirect</p> <p>Streams: 1,178 linear ft (359.1 linear m) direct/ 6,617 linear ft (797.7 linear m) indirect</p> <p>Lakes/Waterbodies<sup>5</sup>: 0.0 ac (0.0 ha) direct/ 3.4 ac (1.38 ha) indirect</p> <p>Potentially affect at least 16 named and unnamed water resources, including Oyster Point Channel, San Bruno Channel, San Bruno Canal, Colma Creek, Mills Creek, San Mateo Creek, and Pulgas Creek.</p>
<b>Biological Resources Including Wetlands</b> Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	<p>Wetlands<sup>v</sup>: 0.08 ac (0.032 ha) direct/ 147.9 ac (59.85 ha) indirect</p> <p>Non-Wetland Waters: 590 linear ft (179.8 linear m)</p> <p>Species: 19 special-status plant and 29 special-status wildlife species</p> <p>This alignment alternative would have potential to directly and indirectly impact wetlands and non-wetland waters. Alignment alternative would have the potential to impact both special-status plant and wildlife species. Potential species impacts include San Mateo thorn-mint, Contra Costa goldfields, California clapper rail, and California least tern. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.</p>
<b>Fault Crossings</b>	San Bruno (Potentially Active) – At Grade
<b>Section 4(f) and 6(f) Resources:</b> <sup>4</sup> Number of resources rated high potential direct effects	Public parks, recreation lands, wildlife and waterfowl refuges within 0–150 ft (46 m) from center of alignment alternative include (1) Herman Street Park, (2) Washington Park, (3) Trinta Park, and (4) San Mateo County Fairgrounds. Few potential direct impacts are anticipated given that much of the alignment alternative is within or directly adjacent to existing transportation rights-of-way.

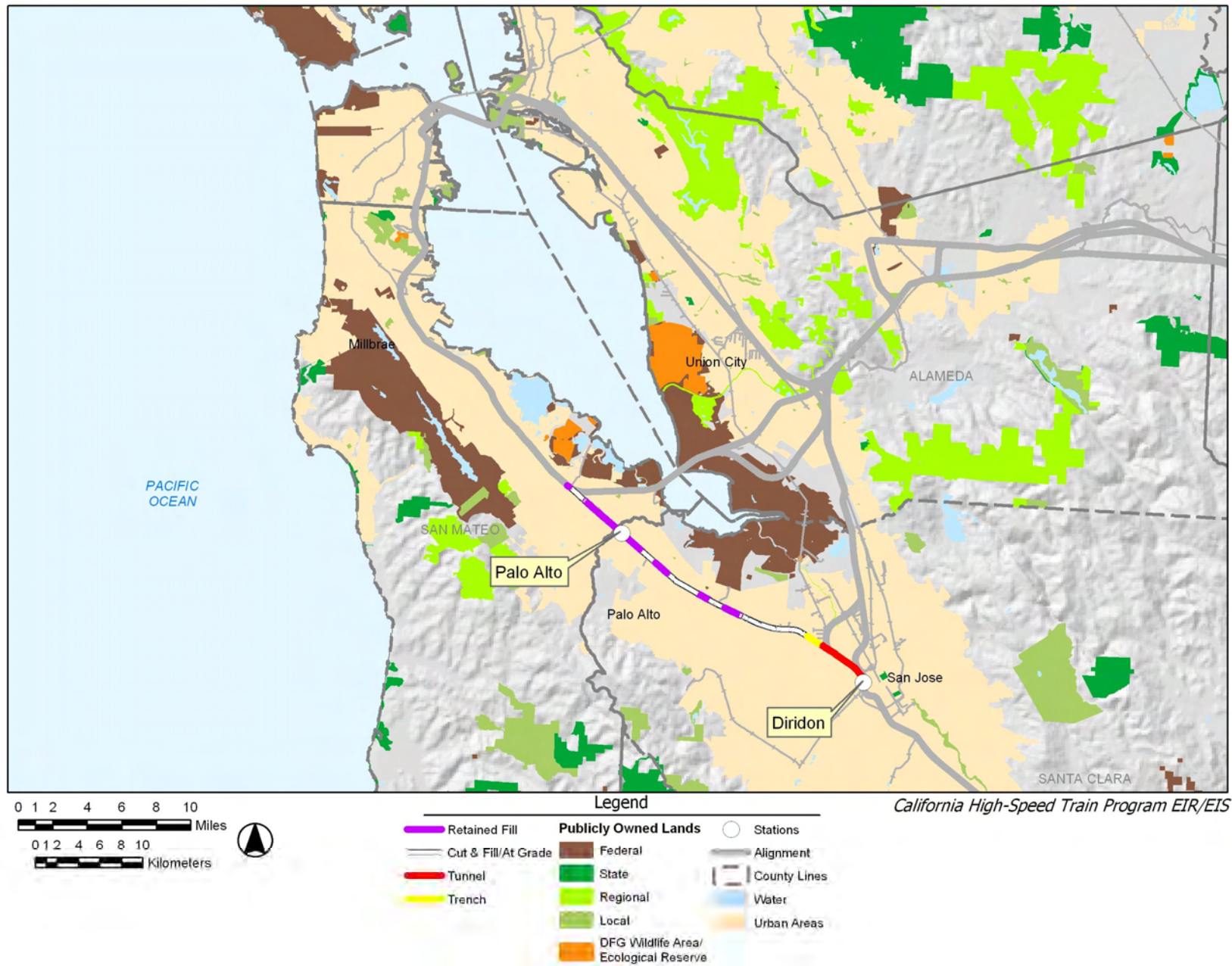
## B. CALTRAIN (DUMBARTON TO SAN JOSE)

This alignment alternative is shown in Figure 7.3-2 and described in Table 7.3-2.

**Table 7.3-2**  
**Caltrain: Dumbarton to San Jose**

<b>Physical/Operational Characteristics</b>	
<b>Alignment Alternative Description</b>	From Dumbarton to San Jose, this alignment alternative would use the existing Caltrain rail right-of-way. Station location options considered for this alternative are Palo Alto (Caltrain), and San Jose (Diridon).
<b>Length</b>	21.38 mi (34.40 km)
<b>Cost (dollars)</b>	\$1.61 billion
<b>Express Travel Times</b>	13.5 minutes Dumbarton–San Jose (Redwood City–San Jose)
<b>Ridership</b>	This alignment alternative would provide direct HST service on the SF Peninsula/Caltrain Corridor between San Jose and Redwood City.
<b>Constructability</b>	Maintaining operations on the existing commuter rail service while constructing grade separations, tunnels, elevated sections, and stations would involve major construction issues/challenges. However, the infrastructure improvements could be constructed incrementally.
<b>Operational Issues</b>	Average speed = 92 mph (153.3 kph) Maximum speed = 120 mph (200 kph) HST operations would need to be coordinated and integrated with Caltrain service.
<b>Potential Environmental Impacts</b>	
<b>Travel Conditions</b>	The Caltrain corridor alignment alternative would bring direct HST service to the Southern Peninsula with potential stations in Palo Alto, and a Station in downtown San Jose (Diridon). This alignment alternative would increase connectivity and accessibility to San Jose and the Peninsula. The HST system would provide a safer, more reliable, energy-efficient intercity mode along the Peninsula while improving the safety, reliability, and performance of the regional commuter service. This alignment alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic. The fully grade-separated Caltrain corridor south of Dumbarton would improve local traffic flow and reduce air pollution at existing rail crossings.
<b>Noise and Vibration:</b> <sup>i</sup> High, medium, or low potential impacts	Medium potential of noise impacts. High potential of vibration impacts. Dense urban area surrounding land uses. There would be an increase in noise levels due to increased frequency of trains. There would be a reduction in noise levels due to the elimination of horn noise and gate noise from existing services as a result of the grade separations at existing grade crossings.
<b>Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice</b>	Compatibility: The majority of this alignment alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. Environmental Justice: This alignment alternative has medium environmental justice impact rating for the Caltrain





**Figure 7.3-2**  
**HST Alignment Alternatives**  
**Caltrain (Dumbarton to San Jose)**



**Table 7.3-2**  
**Caltrain: Dumbarton to San Jose**

	<p>Corridor south of Dumbarton to San Jose.</p> <p>Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: This alignment alternative has the potential for low property impacts.</p>
<b>Aesthetics and Visual Resources:</b> General impacts and rating.	Includes two additional tracks, pedestrian overcrossings and undercrossings at stations, a raised Caltrain right-of-way, a new two-track bridge next to historic San Francisquito Creek truss bridge, and elevated facilities at the Diridon San Jose station. Overall low visual impact
<b>Cultural Resources and Paleontological Resources:</b> <sup>iii</sup> Potential presence of historical resources in area of potential effect	<p>There are 34 known cultural resources.</p> <p>The area around San Jose has a high density of cultural resources. The Santa Clara de Asis Mission in San Jose includes both prehistoric and historic resources.</p>
<b>Hydrology and Water Resources:</b> <sup>iv</sup> Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	<p>Floodplains: 46.5 ac (18.82 ha) direct/ 74.2 ac (30.03 ha) indirect</p> <p>Streams: 1,435 linear ft (437.4 linear m) direct/ 2, 649 linear ft (807.4 linear m) indirect</p> <p>Lakes/Waterbodies<sup>5</sup>: 0.0 ac (0.0 ha) direct/ 0.0 ac (0.0 ha) indirect</p> <p>Potentially affect at least nine named and unnamed water resources, including San Francisquito Creek, Matadero Creek, Barron Creek, Permanente Creek, Stevens Creek, Calabazas Creek, and Saratoga Creek.</p>
<b>Biological Resources Including Wetlands:</b> Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	<p>Wetlands<sup>v</sup>: 0.0 ac (0.0 ha) direct/ 4.1 ac (1.66 ha) indirect</p> <p>Non-Wetland Waters: 672 linear ft (204.8 linear m)</p> <p>Species: 5 special-status plant and 9 special-status wildlife species</p> <p>This alignment alternative would have potential to directly impact non-wetland waters and indirectly impact wetlands. Alignment alternative would have the potential to impact both special-status plant and wildlife species. Potential species impacts include Contra Costa goldfields, San Francisco garter snake, California tiger salamander, and California red-legged frog. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.</p>
<b>Fault Crossings</b>	Buried Trace of Unnamed Fault (Potentially Active) – At Grade
<b>Section 4(f) and 6(f) Resources:</b> <sup>4</sup> Number of resources rated high potential direct effects	Public parks, recreation lands, wildlife and waterfowl refuges within 0–150 ft (46 m) from center of alignment alternative include (1) Holbrook Palmer Park, (2) El Camino Park, (3) Peers Park, (4) Bowden Park, (5) Rengstorff Park, (6) Bracher Park, and (7) San Francisco Bay Trail. Few potential direct impacts are anticipated given that much of the alignment alternative is within or directly adjacent to existing transportation rights-of-way.

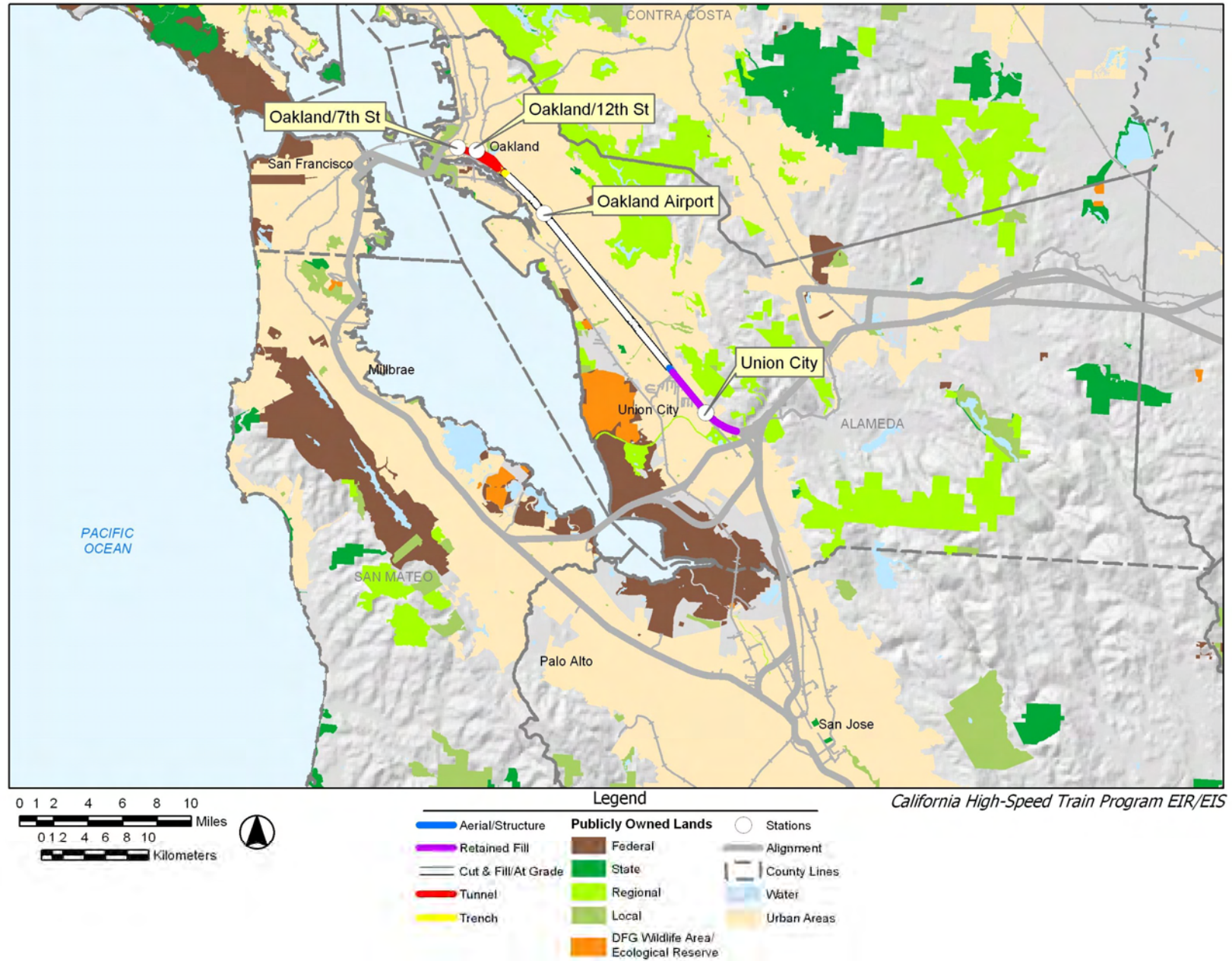
## C. NILES/I-880 ALIGNMENT ALTERNATIVES (OAKLAND TO NILES JUNCTION)

All information presented is for the area from Oakland to Niles Junction. These alternatives are shown in Figure 7.3-3 and described in Table 7.3-3.

**Table 7.3-3**  
**Niles/I-880: Oakland to Niles Junction**

	<b>West Oakland to Niles Junction</b>	<b>12<sup>th</sup> Street/City Center to Niles Junction</b>
<b>Physical/Operational Characteristics</b>		
<b>Alignment Alternative Description</b>	From the West Oakland station site, this is the alignment alternative currently used by the Capitol intercity rail service. From Oakland, this alignment alternative would travel south along the Union Pacific Railroad (UPRR) Hayward Line. Station location options considered in this segment include West Oakland, Oakland International Airport (Coliseum BART) Station, and Union City.	From the 12 <sup>th</sup> Street/City Center downtown Oakland station site, this alignment alternative would travel south following the UPRR Hayward rail line. Station location options considered in this segment include 12 <sup>th</sup> Street/City Center, Oakland International Airport (Coliseum/BART) Station, and Union City.
<b>Length</b>	27.74 mi (44.64 km)	26.73 mi (43.02 km)
<b>Cost (dollars)</b>	\$2.34 billion	\$2.25 billion
<b>Travel Time</b>	12 min (West Oakland-Union City)	11 min (12 <sup>th</sup> Street-Union City)
<b>Ridership</b>	This alignment would directly serve Oakland and Oakland International Airport.	Sensitivity analysis for the Altamont Pass forecast this alternative to have somewhat higher ridership and revenue potential (2.7% more ridership and 1.5% more revenue) than the network alternative to West Oakland. In contrast, for the Pacheco Pass this alternative resulted in somewhat lower ridership and revenue potential (0.6% ridership and 2.5% revenue).
<b>Constructability</b>	Maintaining operations on the existing rail services while constructing grade separations, tunnels, elevated sections, and stations would involve major construction issues/challenges. However, the infrastructure improvements could be constructed incrementally.	Maintaining operations on the existing rail services while constructing grade separations, tunnels, elevated sections, and stations would involve major construction issues/challenges. However, the infrastructure improvements could be constructed incrementally.
<b>Operational Issues</b>	Average speed = 103.5 mph (172.5 kph) Maximum speed = 172.2 mph (287 kph) Potential for shared tracks with Capitol Rail Service. Potential conflict with UPRR freight access and operations.	Average speed = 107.7 mph (179.5 kph) Maximum speed = 172.2 mph (287 kph) Potential for shared tracks with Capitol Rail Service. Potential conflict with UPRR freight access and operations.





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**Figure 7.3-3**  
**HST Alignment Alternatives**  
**Niles/I-880 (Oakland to Niles Junction)**





**Table 7.3-3**  
**Niles/I-880: Oakland to Niles Junction**

	<b>West Oakland to Niles Junction</b>	<b>12<sup>th</sup> Street/City Center to Niles Junction</b>
<b>Potential Environmental Impacts</b>		
<b>Travel Conditions</b>	The Oakland to Niles Junction alignments would bring direct HST service up the East Bay to Oakland with a potential station in West Oakland, at Oakland International Airport (OAK) (Oakland Coliseum), and a potential southern Alameda County station at either Union City or Fremont (Warm Springs). These alignments would increase connectivity and accessibility to Oakland, the East Bay, and Oakland International Airport. The HST system would provide a safer, more reliable, energy-efficient intercity mode directly to the East Bay while improving the safety, reliability and performance of the existing Capitol intercity service (Sacramento to San Jose via I-80) through grade separation improvements between Oakland and Niles Junction. This alignment alternative would increase the capacity for intercity travel in the East Bay and reduce highway congestion.	The Oakland to Niles Junction alignments would bring direct HST service up the East Bay to Oakland with potential stations in Downtown Oakland, at Oakland International Airport (Coliseum/BART), and a potential southern Alameda County station at either Union City or Fremont (Auto Mall Parkway). These alignments would increase connectivity and accessibility to Oakland, the East Bay, and Oakland International Airport. The HST system would provide a safer, more reliable, energy-efficient intercity mode directly to the East Bay while improving the safety, reliability and performance of the existing Capitol intercity service (Sacramento to San Jose via I-80) through grade separation improvements between Oakland and Union City. This alignment alternative would increase the capacity for intercity travel in the East Bay and reduce highway congestion.
<b>Noise and Vibration:</b> <sup>i</sup> High, medium, or low potential impacts	<p>Medium potential of noise impacts. High potential of vibration impacts.</p> <p>There would be an increase in noise levels due to increased frequency of trains. There would be a reduction in noise levels due to the elimination of horn noise and gate noise from existing services as a result of the grade separations at existing grade crossings.</p>	<p>Medium potential of noise impacts. High potential of vibration impacts.</p> <p>There would be an increase in noise levels due to increased frequency of trains. There would be a reduction in noise levels due to the elimination of horn noise and gate noise from existing services as a result of the grade separations at existing grade crossings.</p>
<b>Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice</b>	<p>Compatibility: The majority of this alignment alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Environmental Justice: This alignment alternative has medium environmental justice impact rating.</p> <p>Community: This alignment alternative would not affect community cohesion, given that it is within or immediately</p>	<p>Compatibility: The majority of this alignment alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Environmental Justice: This alignment alternative has medium environmental justice impact rating.</p> <p>Community: This alignment alternative would not affect community cohesion, given that it is within or</p>

**Table 7.3-3**  
**Niles/I-880: Oakland to Niles Junction**

	<b>West Oakland to Niles Junction</b>	<b>12<sup>th</sup> Street/City Center to Niles Junction</b>
	adjacent to an existing major rail or highway rights-of-way. Property: This alignment alternative has the potential for low property impacts.	immediately adjacent to an existing major rail or highway rights-of-way. Property: This alignment alternative has the potential for low property impacts.
<b>Aesthetics and Visual Resources:</b> General impacts and rating.	Includes highway grade separations and an elevated alignment. Overall low visual impact	
<b>Cultural Resources and Paleontological Resources:</b> <sup>iii</sup> Potential presence of historical resources in area of potential effect	There are 24 known cultural resources. The majority of resources are located within the city of Oakland and include the Old Oakland Historic District. Resources include buildings and industrial complexes dating from the 1920s and 1940s and residential properties dating from the 1880s to the 1940s.	32 known cultural resources. This alignment alternative has the highest density of cultural resources within this corridor. The majority of resources are located within the city of Oakland and include buildings and residential properties dating from the 1880s to the 1920s.
<b>Hydrology and Water Resources:</b> <sup>iv</sup> Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	Floodplains: 4.3 ac (1.74 ha) direct/ 9.5 ac (3.84 ha) indirect Streams: 1,035 linear ft (315.5 m) direct/ 8,828 linear ft (2,690.8 linear m) indirect Lakes/Waterbodies: 0.0 ac (0.0 ha) direct/ 0.0 ac (0.0 ha) indirect  Potentially affect at least 13 named and unnamed water resources, including Arroyo Viejo, Lion Creek, San Leandro Creek, San Lorenzo Creek, and Alameda Creek. Includes tunnels that would avoid impacts on the floodplain, and aerial structures that would minimize impact on the floodplain and streams, creeks, and channels.	Floodplains: 4.3 ac (1.74 ha) direct/ 9.5 ac (3.84 ha) indirect Streams: 1,035 linear ft (315.5 m) direct/ 8,828 linear ft (2,690.8 linear m) indirect Lakes/Waterbodies: 0.0 ac (0.0 ha) direct/ 0.0 ac (0.0 ha) indirect  Potentially affect 8 named and unnamed water resources, including Mission Creek, Alameda Creek, the Lagoon/Elizabeth Lake, Penitencia Creek, and Mud Slough/Coyote Creek. Includes tunnels that would avoid impacts on the floodplain, and aerial structures that would minimize impact on the floodplain and streams, creeks, and channels.

**Table 7.3-3  
Niles/I-880: Oakland to Niles Junction**

	<b>West Oakland to Niles Junction</b>	<b>12<sup>th</sup> Street/City Center to Niles Junction</b>
<b>Biological Resources Including Wetlands</b> Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	<p>Wetlands<sup>v</sup>: 0.11 ac (0.04 ha) direct/ 52.1 ac (21.07 ha) indirect</p> <p>Non-Wetland Waters: 455 linear ft (138.7 linear m)</p> <p>Species: 5 special-status plant and 23 special-status wildlife species</p> <p>This alignment alternative would have potential to indirectly impact the most wetlands. Alignment alternative would have the potential to impact the least plant species. Potential species impacts include Presidio clarkia, brown pelican, California clapper rail, California least tern, and salt marsh harvest mouse. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.</p>	<p>Wetlands<sup>v</sup>: 0.11 ac (0.04 ha) direct/ 30.2 ac (12.21 ha) indirect</p> <p>Non-Wetland Waters: 455 linear ft (138.7 linear m)</p> <p>Species: 6 special-status plant and 23 special-status wildlife species</p> <p>This alignment alternative would have potential to indirectly impact the least wetlands. Alignment alternative would have the potential to impact the most plant species. Potential species impacts include Presidio clarkia, brown pelican, California clapper rail, California least tern, and salt marsh harvest mouse. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.</p>
<b>Fault Crossings</b>	Hayward (Active) – At Grade - Adjacent and Parallel	
<b>Section 4(f) and 6(f) Resources:</b> <sup>4</sup> Number of resources rated high potential direct effects	Public parks, recreation lands, wildlife and waterfowl refuges within 0–150 ft (46 m) from center of Alignment Alternative include (1) Coliseum Gardens Park, (2) Stonehurst Recreation Area Park, (3) Charles F. Kennedy Park, (4) Quarry Lakes Regional Park, (5) Rancho Arroyo Park, and (6) San Francisco Bay Trail. Few potential direct impacts are anticipated given that much of the alignment alternative is within or directly adjacent to existing transportation rights-of-way.	Public parks, recreation lands, wildlife and waterfowl refuges within 0–50 ft from center of alignment alternative include Madison Park, (2) Coliseum Gardens Park, (3) Stonehurst Recreation Area Park, (4) Charles F. Kennedy Park, (5) Quarry Lakes Regional Park, (6) Rancho Arroyo Park, and (7) San Francisco Bay Trail. Few potential direct impacts are anticipated given that much of the alignment alternative is within or directly adjacent to existing transportation rights-of-way.

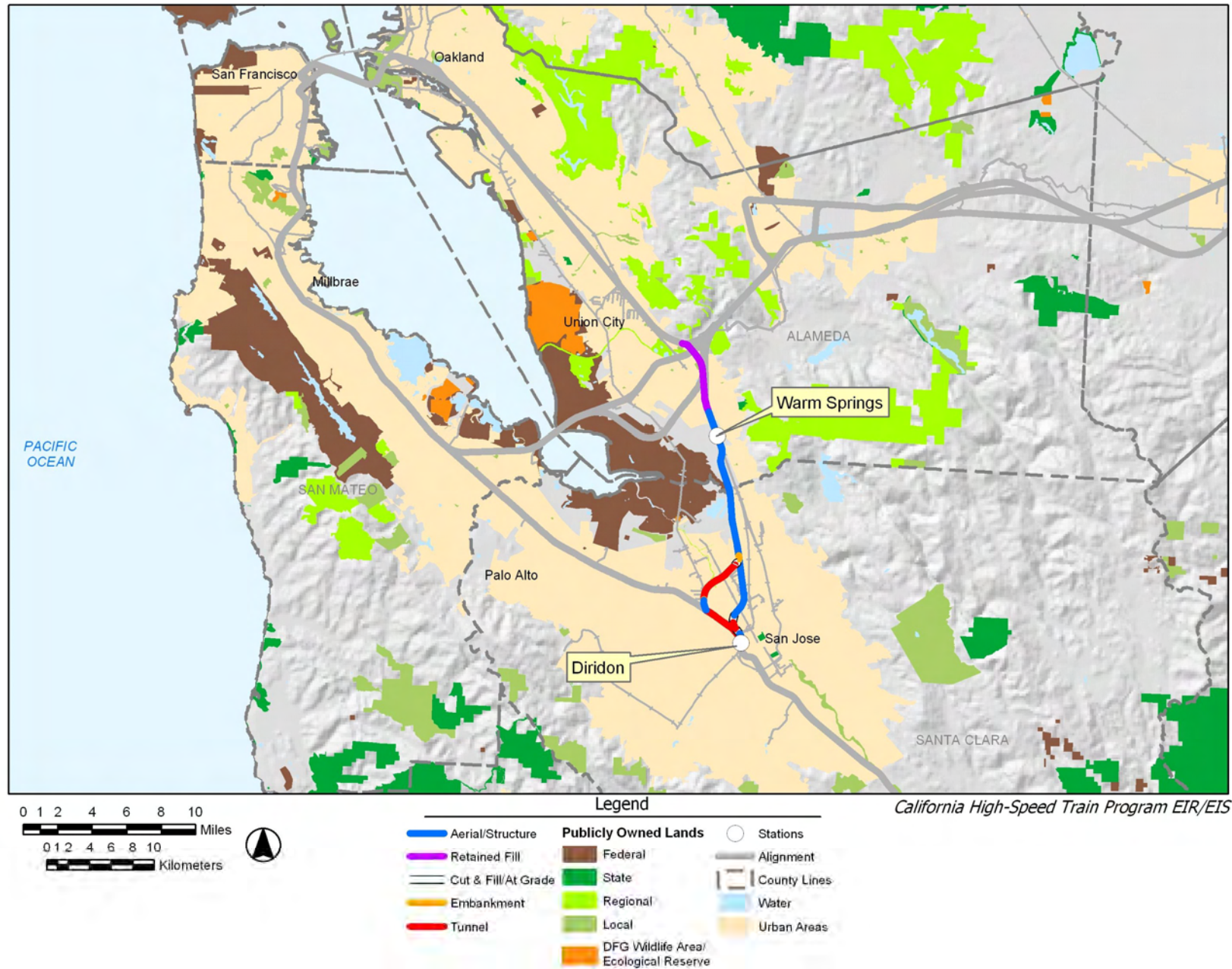
## D. NILES/I-880 ALIGNMENT ALTERNATIVES (NILES JUNCTION TO SAN JOSE)

All information presented is for the area from Niles Junction to San Jose. This alignment alternative is shown in Figure 7.3-4 and described in Table 7.3-4.

**Table 7.3-4**  
**Niles/I-880: Niles Junction to San Jose**

	Niles Junction to San Jose via Trimble	Niles Junction to San Jose via I-880
<b>Physical/Operational Characteristics</b>		
<b>Alignment Alternative Description</b>	From Niles Junction, this alignment alternative would travel south along the Union Pacific Railroad (UPRR) Hayward Line to the UPRR Milpitas Line (through Fremont), transition to the I-880 median, and then transition to Trimble road to San Jose. Station options considered in this segment include Fremont (Warm Springs) and San Jose Diridon.	From Niles Junction, this alignment alternative would travel south along the Union Pacific Railroad (UPRR) Hayward Line to the UPRR Milpitas Line (through Fremont), and then transition to the I-880 median to San Jose. Station options considered in this segment include Fremont (Warm Springs) and San Jose Diridon.
<b>Length</b>	17.04 mi (27.43 km)	16.22 mi (26.10 km)
<b>Cost (dollars)</b>	\$2.18 billion	\$1.61 billion
<b>Travel Time</b>	15 min (San Jose–Union City)	13 min (San Jose–Union City)
<b>Ridership</b>	Would have slightly less intercity ridership potential as Niles Junction to San Jose via I-880 alternative (as a result of the 2-minute additional travel times).	Would have about slightly more ridership potential as Niles Junction to San Jose via Trimble alternative.
<b>Constructability</b>	Major construction issues associated with constructing columns and footings in the wide median of I-880 (between San Jose and Fremont) and tunneling adjacent to San Jose Airport along Trimble Road.	Major construction issues associated with constructing columns and footings in the wide median of I-880 (between San Jose and Fremont).
<b>Operational Issues</b>	Average speed = 87.1 mph (145.2 kph) Maximum speed = 134.4 mph (224 kph) Potential for shared tracks with Capitol Rail Service. Potential conflict with UPRR freight access and operations.	Average speed = 93.3 mph (155.5 kph) Maximum speed = 151.8 mph (253 kph) Potential for shared tracks with Capitol Rail Service. Potential conflict with UPRR freight access and operations.
<b>Potential Environmental Impacts</b>		
<b>Travel Conditions</b>	These alignments would increase connectivity and accessibility to the East Bay and San Jose. The HST system would provide a safer, more reliable, energy-efficient intercity mode directly to the East Bay. This alignment alternative would increase the capacity for intercity travel in	These alignments would increase connectivity and accessibility to the East Bay, and San Jose. The HST system would provide a safer, more reliable, energy-efficient intercity mode directly to the East Bay. This alignment alternative would greatly increase the





**Figure 7.3-4**  
**HST Alignment Alternatives**  
**Niles/I-880 (Niles Junction to San Jose)**



**Table 7.3-4**  
**Niles/I-880: Niles Junction to San Jose**

	<b>Niles Junction to San Jose via Trimble</b>	<b>Niles Junction to San Jose via I-880</b>
	the East Bay and reduce highway congestion.	capacity for intercity travel in the East Bay and reduce highway congestion.
<b>Noise and Vibration:</b> <sup>i</sup> High, medium, or low potential impacts	Medium potential of noise impacts. Medium potential of vibration impacts.	Medium potential of noise impacts. Medium potential of vibration impacts.
<b>Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice</b>	<p>Compatibility: The majority of this alignment alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Environmental Justice: This alignment alternative has medium environmental justice impact rating for East Bay between Niles Junction and San Jose, using Trimble Road.</p> <p>Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: This alignment alternative has the potential for low property impacts.</p>	<p>Compatibility: The majority of this alignment alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Environmental Justice: This alignment alternative has medium environmental justice impact rating for East Bay between Niles Junction and San Jose.</p> <p>Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: This alignment alternative has the potential for low property impacts.</p>
<b>Aesthetics and Visual Resources:</b> General impacts and rating.	Includes elevated alignment adjacent to residential, along I-880 freeway and at the Diridon San Jose station. Overall medium visual impact	Include elevated alignment adjacent to residential, along I-880, along Montague and Trimble Road, near the historic Santa Clara Depot and Tower, and at the Diridon San Jose station. Overall medium visual impact
<b>Cultural Resources and Paleontological Resources:</b> <sup>iii</sup> Potential presence of historical resources in area of potential effect	<p>There are 31 known cultural resources.</p> <p>The majority of resources are located within San Jose, which includes the Santa Clara de Asis Mission. The remains of a Pleistocene mammoth were discovered near the airport in 2005.</p>	<p>There are 4 known cultural resources.</p> <p>There are few archaeological or architectural resources located in the area of San Jose.</p>
<b>Hydrology and Water Resources:</b> <sup>iv</sup> Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	<p>Floodplains: 36.4 ac (14.73 ha) direct/ 129.8 ac (52.53 ha) indirect</p> <p>Streams: 1,013 linear ft (308.8 m) direct/ 2,220 linear ft (676.7 linear m) indirect</p> <p>Lakes/Waterbodies: 0.7 ac (0.28 ha) direct/ 1.3 ac (0.53 ha) indirect</p>	<p>Floodplains: 45.5 ac (18.41ha) direct/ 167 ac (67.58 ha) indirect</p> <p>Streams: 1,135 linear ft (345.9 m) direct/ 2,707 linear ft (825.1 linear m) indirect</p> <p>Lakes/Waterbodies: 0.7 ac (0.28 ha) direct/ 1.3 ac (0.53 ha) indirect</p>

**Table 7.3-4**  
**Niles/I-880: Niles Junction to San Jose**

	<b>Niles Junction to San Jose via Trimble</b>	<b>Niles Junction to San Jose via I-880</b>
	Potentially affect 8 named and unnamed water resources, including Mission Creek, Alameda Creek, the Lagoon/Elizabeth Lake, Penitencia Creek, and Mud Slough/Coyote Creek. Tunnel would extend under the Guadalupe River and Coyote Creek.	Potentially affect 10 named and unnamed water resources, including Mission Creek, Alameda Creek, the Lagoon/Elizabeth Lake, Penitencia Creek, Mud Slough/Coyote Creek, and Guadalupe River. Aerial structure would extend over the Guadalupe River and Coyote Creek.
<b>Biological Resources Including Wetlands</b> Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	<p>Wetlands<sup>v</sup>: 1.27 ac (0.51 ha) direct/ 302.3 ac (122.34 ha) indirect</p> <p>Non-Wetland Waters: 958 linear ft (292.0 linear m)</p> <p>Species: 6 special-status plant and 25 special-status wildlife species</p> <p>This alignment alternative would have potential to directly and indirectly impact the least wetlands and non-wetland waters. Alignment alternative would have the potential to impact the most plant species. Potential species impacts include Contra Costa goldfields, vernal pool tadpole shrimp, brown pelican, California clapper rail, California least tern, and salt marsh harvest mouse. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.</p>	<p>Wetlands<sup>v</sup>: 1.80 ac (0.73 ha) direct/ 323.7 ac (131.01 ha) indirect</p> <p>Non-Wetland Waters: 1,080 linear ft (329.2 linear m)</p> <p>Species: 5 special-status plant and 25 special-status wildlife species</p> <p>This alignment alternative would have potential to directly and indirectly impact the most wetlands and non-wetland waters. Alignment alternative would have the potential to impact fewer plant species. Potential species impacts include Contra Costa goldfields, vernal pool tadpole shrimp, brown pelican, California clapper rail, California least tern, and salt marsh harvest mouse. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.</p>
<b>Fault Crossings</b>	<p>Hayward Fault (Active) – At Grade</p> <p>Silver Creek Fault (Potentially Active) – Above Grade</p>	
<b>Section 4(f) and 6(f) Resources:</b> <sup>4</sup> Number of resources rated high potential direct effects	Public parks, recreation lands, wildlife and waterfowl refuges within 0–150 ft (46 m) from center of alignment alternative include (1) Fremont Central Park, (2) Grimmer Park. Few potential direct impacts are anticipated given that much of the Alignment Alternative is within or directly adjacent to existing transportation rights-of-way, and no resources exist in areas where the Alignment Alternative is not adjacent to or within this existing right-of-way.	Public parks, recreation lands, wildlife and waterfowl refuges within 0–150 ft (46 m) from center of alignment alternative include (1) Fremont Central Park, (2) Grimmer Park, (3) Columbus Park, (4) Heritage Rose Garden, and (5) Guadalupe Gardens. Few potential direct impacts are anticipated given that much of the alignment alternative is within or directly adjacent to existing transportation rights-of-way.

## E. PACHECO PASS ALTERNATIVE

All information presented is for the area from San Jose Diridon Station to San Luis Reservoir. This segment is shown in Figure 7.3-5 and described in Table 7.3-5.

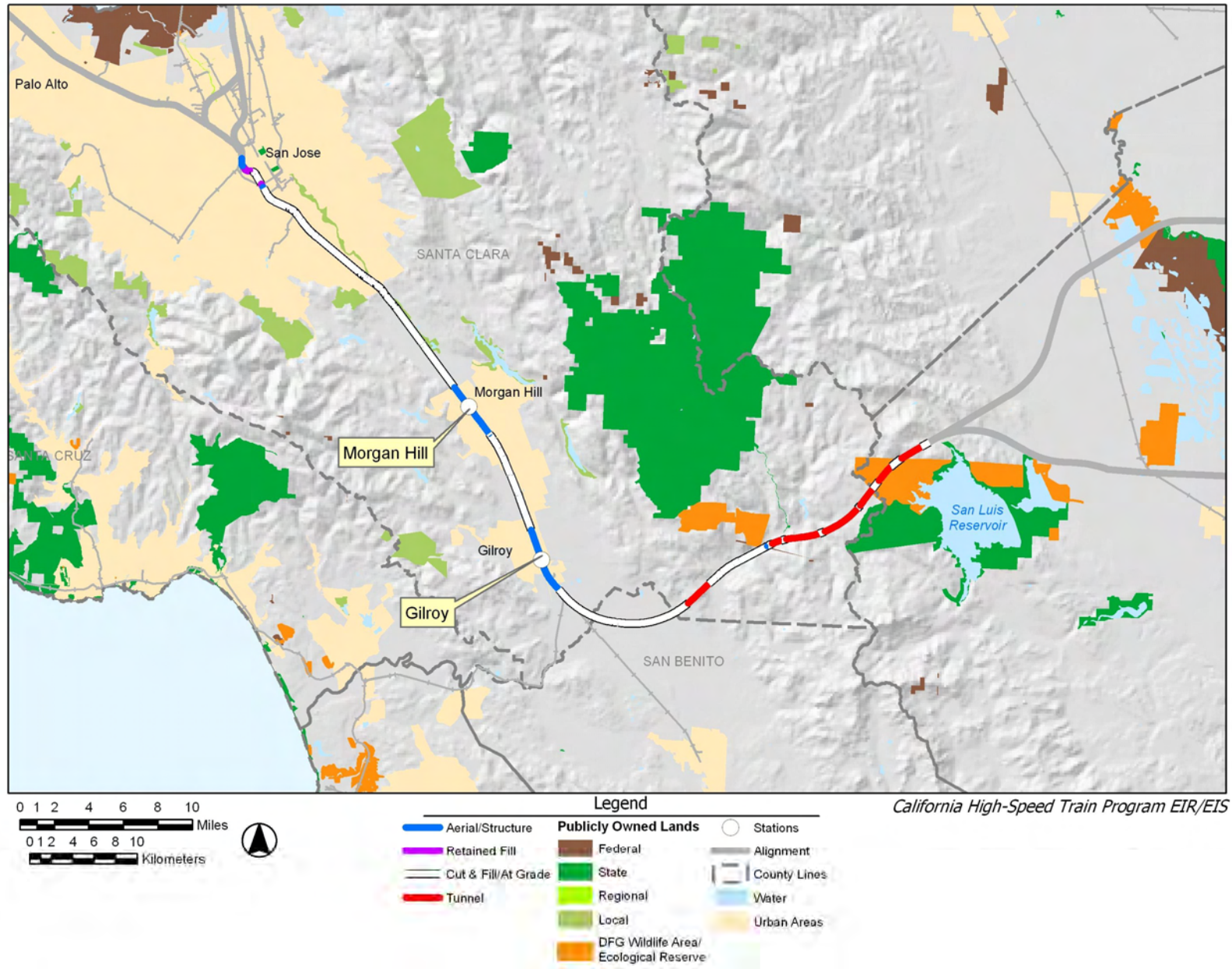
**Table 7.3-5**  
**Pacheco Pass Alternatives: San Jose Diridon Station to San Luis Reservoir**

<b>Alignment Alternative Description</b>	From the Diridon Station site in downtown San Jose, this alignment alternative would travel south following the Caltrain alignment to Gilroy. From Gilroy, the alignment alternative would travel east through Pacheco Pass to the Central Valley floor. Station options considered in this segment include Morgan Hill (Caltrain) or Gilroy (Caltrain).
<b>Length</b>	57.48 mi (92.5 km)
<b>Cost (dollars)</b>	\$3.74 billion
<b>Travel Time</b>	14.5 min (San Jose–Gilroy)
<b>Ridership</b>	This alignment alternative provides high HST ridership potential to the Bay Area via the Pacheco Pass.
<b>Constructability</b>	Difficult to maintain roadway and existing freight and passenger rail operations during construction of the HST infrastructure.
<b>Operational Issues</b>	Average speed = 118.6 mph (197.6 kph) Maximum speed = 178.8 mph (298 kph) Potential for shared tracks with Caltrain commuter rail Service. Potential conflict with UPRR freight access and operations.
<b>Travel Conditions</b>	The Pacheco alignments would bring direct HST service up the Caltrain alignment with a potential station at Gilroy (Caltrain) or Morgan Hill (Caltrain). This alignment alternative would increase connectivity and accessibility to Southern Santa Clara County and Monterey/ Santa Cruz/ Salinas area. The HST system would provide a safer, more reliable, energy-efficient intercity mode directly to Santa Clara County while improving the safety, reliability and performance of the existing Caltrain commuter rail service through grade separation improvements between Gilroy and San Jose. This alignment alternative would greatly increase the capacity for intercity travel in Santa Clara County and reduce highway congestion. The Gilroy station would be the closest HST station for Monterey, Santa Cruz, and San Benito counties.
<b>Noise and Vibration:</b> <sup>i</sup> High, medium, or low potential impacts	Medium potential of noise impacts. Medium potential of vibration impacts. There would be an increase in noise levels due to increased frequency of trains. There would be a reduction in noise levels due to the elimination of horn noise and gate noise from existing services as a result of the grade separations at existing grade crossings.
<b>Land Use and Planning, Communities and Neighborhoods, Property, and Environmental</b>	Compatibility: The majority of this alignment alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. It exhibits low compatibility where it does not follow a transportation right-of-way east of Gilroy.



**Table 7.3-5  
Pacheco Pass Alternatives: San Jose Diridon Station to San Luis Reservoir**

<b>Justice</b>	<p>Environmental Justice: This alignment alternative has medium environmental justice impact rating.</p> <p>Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way in the urban areas.</p> <p>Property: This alignment alternative has the potential for low property impacts.</p>
<b>Aesthetics and Visual Resources:</b> General impacts and rating.	Includes elevated facilities at the Diridon San Jose station, elevated facilities south of Diridon station, highway grade separations, expansion of existing railway corridor along Monterey Highway, new transportation corridor between Gilroy and Pacheco Valley, elevated crossing of SR 152 in Pacheco Valley, and cut and fill sections over Pacheco Pass. Overall medium visual impact.
<b>Farmlands:</b> <sup>ii</sup> Ac (ha) potentially affected	<p>Farmland: 241 ac (97.5 ha)</p> <p>Impact up to 176 ac (71.2 ha) of prime farmland. High potential for farmland severance south of Gilroy.</p>
<b>Cultural Resources and Paleontological Resources:</b> <sup>iii</sup> Potential presence of historical resources in area of potential effect	<p>There are 11 known cultural resources.</p> <p>Little development has taken place along this alignment. Resources include buildings, canals, and a bridge as well as potentially historic resources in the Santa Clara Valley, including Morgan Hill and Gilroy.</p>
<b>Hydrology and Water Resources:</b> <sup>iv</sup> Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	<p>Floodplains: 103.4 ac (41.85 ha) direct/ 303.5 ac (122.8 ha) indirect</p> <p>Streams: 2,674 linear ft (815.0 m) direct/ 9,215 linear ft (2,808.7 linear m) indirect</p> <p>Lakes/Waterbodies<sup>5</sup>: 0.0 ac (0.0 ha) direct/ 0.0 ac (0.0 ha) indirect</p> <p>Potentially affect at least 13 unnamed and named water resources, including Los Gatos Creek, Guadalupe River, Little Llagas Creek, Llagas Creek, Miller Slough, Pajaro River, Pacheco Creek, and Tequisquita Slough. A combination of at-grade permeable track, aerial structure, and tunnels would minimize impacts.</p>
<b>Biological Resources Including Wetlands</b> Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	<p>Wetlands<sup>v</sup>: 0.11 ac (0.04 ha) direct/ 43.8 ac (17.73 ha) indirect</p> <p>Non-Wetland Waters: 1,960 linear ft (597.4 linear m)</p> <p>Species: 23 special-status plant and 27 special-status wildlife species</p> <p>This alignment alternative would have potential to indirectly impact a substantial amount of wetlands and non-wetland waters. Alignment alternative would also have the potential to impact plant and wildlife species. Potential species impacts include Tiburon Indian paintbrush, Santa Clara Valley dudleya, Bay checkerspot butterfly, California red-legged frog, and San Joaquin kit fox. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.</p>
<b>Fault Crossings</b>	<p>Silver Creek (Potentially Active) – At Grade</p> <p>Calaveras (Active) – At Grade</p>



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**Federal Railroad  
Administration**

**Figure 7.3-5**  
**HST Alignment Alternatives**  
**Pacheco Pass Alternatives**  
**(San Jose to San Luis Reservoir)**



**Table 7.3-5**  
**Pacheco Pass Alternatives: San Jose Diridon Station to San Luis Reservoir**

<b>Section 4(f) and 6(f) Resources:</b> <sup>4</sup> Number of resources rated high potential direct effects	Public parks, recreation lands, wildlife and waterfowl refuges within 0–150 ft (46 m) from center of alignment alternative include (1) Edenvale Garden Park, (2) Coyote Creek Park, and (3) Upper Cottonwood Wildlife Area. Few potential direct impacts are anticipated given that much of the alignment alternative is within or directly adjacent to existing transportation rights-of-way, and few resources exist in areas where the alignment alternative is not adjacent to or within this existing right-of-way.
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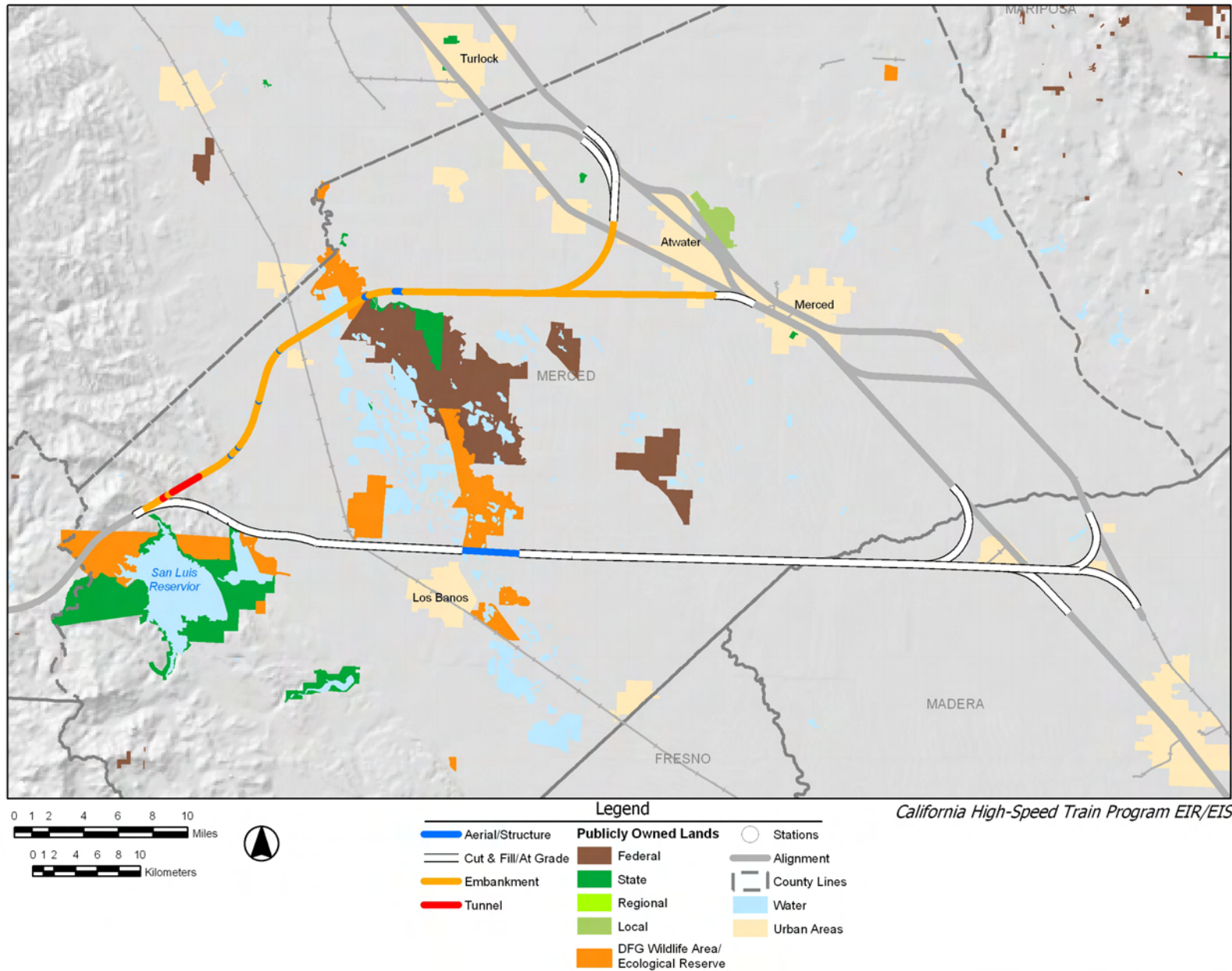
## F. PACHECO PASS ALTERNATIVES

All information presented is for the area from San Luis Reservoir to UPRR or BNSF. This segment is shown in Figure 7.3-6 and described in Table 7.3-6.

**Table 7.3-6**  
**Pacheco Pass Alternatives: San Luis Reservoir to UPRR or BNSF**

	<b>GEA North</b>	<b>Henry Miller (UPRR Connection)</b>	<b>Henry Miller (BNSF Connection)</b>
<b>Alignment Alternative Description</b>	From the Central Valley floor, this alignment alternative would pass through the northern portion of the GEA.	From the Central Valley floor, this alignment alternative would pass north of Santa Nella and would then generally follow Henry Miller Avenue to the UPRR N/S line in the Central Valley.	From the Central Valley floor, this alignment alternative would pass north of Santa Nella and would then generally follow Henry Miller Avenue to the BNSF N/S line in the Central Valley.
<b>Length</b>	60.22 mi (96.92 km)	62.69 mi (100.89 km)	65.06 mi (104.70 km)
<b>Cost (dollars)</b>	\$1.41 billion	\$1.36 billion	\$1.40 billion
<b>Travel Time</b>	Gilroy–Briggsmore=32 min (88.66 mi; 142.7 km) Gilroy–Modesto=33 min (91.04 mi; 146.5 km) Gilroy–Fresno (UPRR)=43 min (128 mi; 206 km) Gilroy–Fresno (BNSF)=44 min (135.4 mi; 217.8 km)	Gilroy–Briggsmore=44 min (133 mi; 214 km) Gilroy–Modesto=45 min (130 mi; 209 km) Gilroy–Fresno=40 min (115 mi; 185 km)	Gilroy–Briggsmore=48 min (150 mi; 241 km) Gilroy–Modesto=49 min (147 mi; 237 km) Gilroy–Fresno=40 min (119 mi; 192 km)
<b>Ridership</b>	Forecast to have slightly less ridership (2.3%) and revenue (1%) than the Henry Miller Road (UPRR Connection) Alternative. Higher ridership between Sacramento and the Bay Area would offset less ridership between the Bay Area and southern California.	This Alternative would have slightly higher ridership potential than the GEA North Alternative.	This Alternative would have slightly less ridership potential than the Henry Miller Alternative (UPRR Connection) as a result of longer travel times between the Bay Area and Sacramento.
<b>Constructability</b>	Would require more grade separations than Henry Miller at the eastern end of the alignment.	Would require aerial segment through sensitive grasslands/wetlands area.	Would require aerial segment through sensitive grasslands/wetlands area.





**Figure 7.3-6**  
**HST Alignment Alternatives**  
**Pacheco Pass Alternatives**  
**(San Luis Reservoir to UPRR or BNSF)**



**Table 7.3-6  
Pacheco Pass Alternatives: San Luis Reservoir to UPRR or BNSF**

	<b>GEA North</b>	<b>Henry Miller (UPRR Connection)</b>	<b>Henry Miller (BNSF Connection)</b>
<b>Operational Issues</b>	<p>Gilroy–Briggsmore Average speed=161.1 mph (268.6 kph) Maximum speed=210 mph (350 kph)</p> <p>Gilroy–Modesto Average speed=161.8 mph (269.6 kph) Maximum speed=210 mph (350 kph)</p> <p>Gilroy–Fresno (UPRR) Average speed=170.8 mph (284.6 kph) Maximum speed=210mph (350 kph)</p> <p>Gilroy–Fresno (BNSF) Average speed=171 mph (285 kph) Maximum speed=210 mph (350 kph)</p>	<p>Gilroy–Briggsmore Average speed=168.6 mph (281 kph) Maximum speed=210 mph (350 kph)</p> <p>Gilroy–Modesto Average speed=170.1 mph (283.5kph) Maximum speed=210 mph (350 kph)</p> <p>Gilroy–Fresno Average speed=166.8 mph (277.9kph) Maximum speed=210 mph (350 kph)</p>	<p>Gilroy–Briggsmore Average speed=168.6 mph (281 kph) Maximum speed=210 mph (350 kph)</p> <p>Gilroy–Modesto Average speed=172.2 mph (287 kph) Maximum speed=210 mph (350 kph)</p> <p>Gilroy–Fresno Average speed=166.9 mph (278.2 kph) Maximum speed=210 mph (350 kph)</p>
<b>Travel Conditions</b>	This alignment alternative would have increased travel times between Los Angeles and San Jose, but would reduce travel times between San Jose and Sacramento.	This alignment alternative would generally parallel an existing roadway corridor (Henry Miller Road) in the Central Valley. It would provide the most direct route between Los Angeles and San Jose.	
<b>Noise and Vibration:</b> <sup>1</sup> High, medium, and low potential impacts	Low potential of noise impacts. Low potential of vibration impacts.. Introduces new potential impacts in partially residential area on what is currently a sparsely used freight line.	Low potential of noise impacts. Low potential of vibration impacts... Trains at conventional speeds. There would be a reduction in noise levels due to the elimination of horn noise and gate noise from existing services as a result of the grade separations at some existing grade crossings. The grade crossing noise reduction (elimination of horn noise and gate noise from existing services) as a result of the grade separations would offset the increase in train frequencies.	
<b>Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice</b>	<p>Compatibility: The majority of this alignment alternative is incompatible (low rating), given that it is within or immediately adjacent to agricultural land.</p> <p>Environmental Justice: This alignment alternative has high environmental justice impact rating. It traverses lower</p>	<p>Compatibility: Highly compatible with existing Henry Miller Road between Santa Nella and Elgin Avenue. New alignment right-of-way would be incompatible with agricultural uses east of Elgin Avenue.</p> <p>Environmental Justice: This alignment alternative has low environmental justice impact rating. Although the environmental justice percentage thresholds are exceeded east of Gilroy, the environmental justice populations are sparse and distant from the HST line.</p>	

**Table 7.3-6  
Pacheco Pass Alternatives: San Luis Reservoir to UPRR or BNSF**

	<b>GEA North</b>	<b>Henry Miller (UPRR Connection)</b>	<b>Henry Miller (BNSF Connection)</b>
	<p>land use density areas with higher minority and low income populations.</p> <p>Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way in the urban areas.</p> <p>Property: This alignment alternative has the potential for low property impacts because it either traverses existing transportation right-of-way or through rural land.</p>	<p>Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way in the urban areas.</p> <p>Property: This alignment alternative has the potential for low property impacts because it either traverses existing transportation right-of-way or through rural land.</p>	
<b>Aesthetics and Visual Resources:</b> General impacts and rating.	Includes new transportation corridor between Pacheco Pass and Gustine, elevated crossing of I-5, wetlands crossings, and new transportation corridor connections to UPRR or BNSF in Chowchilla. Overall medium visual impact.	Includes a trench near the San Joaquin National Cemetery, an elevated crossing of I-5, and wetlands crossings. Overall low visual impact.	
<b>Farmlands:</b> <sup>ii</sup> Ac (ha) potentially affected	<p>Farmland: 271 ac (110 ha)</p> <p>Similar farmland impacts as the Henry Miller (UPRR Connection), but have the greatest impact on prime farmland. Impact up to 137 ac (55.4 ha) of prime farmland. Highest potential for farmland severance.</p>	Farmland: 265 ac (107 ha)	Farmland: 295 ac (119 ha)
		Less farmland impacts than either the GEA North or Henry Miller (BNSF Connection). Impact up to 128 ac (52 ha) of prime farmland. Generally follows existing roadway, but potential for farmland severance.	Would have greatest potential impacts on farmlands. Impact up to 130 ac (52.4 ha) of prime farmland. Generally follows existing roadway, but potential for farmland severance.
<b>Cultural Resources and Paleontological Resources:</b> <sup>iii</sup> Potential presence of historical resources in area of potential effect	There are 9 known cultural resources. Much of the area along this alignment alternative has seen little development historically. Previously recorded resources include prehistoric archaeological sites and architectural resources.	There are 5 known cultural resources.	There are 5 known cultural resources.
		Much of the area along this alignment alternative has seen little development historically. Previously recorded resources include an archaeological site and architectural resources.	Much of the area along this alignment alternative has seen little development historically. Previously recorded resources include an archaeological site and architectural resources.

**Table 7.3-6  
Pacheco Pass Alternatives: San Luis Reservoir to UPRR or BNSF**

	<b>GEA North</b>	<b>Henry Miller (UPRR Connection)</b>	<b>Henry Miller (BNSF Connection)</b>
<b>Hydrology and Water Resources:</b> <sup>iv</sup> Potential impacts and associated ac (ha) of floodplains, and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	<p>Floodplains: 53.08 ac (21.48 ha) direct/ 158.3 ac (64.04 ha) indirect</p> <p>Streams: 6,771 linear ft (2,063.8 linear m) direct/ 20,436 linear ft (6,228.9 linear m) indirect</p> <p>Lakes/Waterbodies: <u>2.3</u> (0.93 ha) direct/ 8.4 ac (3.40 ha) indirect</p> <p>Potentially affect at least 44 unnamed and named water resources, including (i.e., not limited to) California Aqueduct, Mendota Canal, Garzas Creek, Sullivan Extension, Duck Ponds, Mud Slough, San Joaquin River, Cottonwood Creek, Los Banos Creek, Livingston Canal, and the Merced River.</p>	<p>Floodplains: 126.4 ac 51.15( ha) direct/ 469.5 ac (190.01 ha) indirect</p> <p>Streams: 6,697 linear ft (2,041.2 linear m) direct/ 44,458 linear ft (13,550.8 linear m) indirect</p> <p>Lakes/Waterbodies: <u>2.5</u> (1.01 ha) direct/ 10.0 ac (4.05 ha) indirect</p> <p>Potentially affect at least 44 unnamed and named water resources, including Tule Lake, California Aqueduct, San Louis Creek, Mendota Canal, Los Banos Creek, San Louis Wasteway, Mud Slough, Delta Canal, San Joaquin River, Chowchilla River, and Berenda Slough.</p> <p>Primarily at-grade and adjacent to Henry Miller Road and elevated through portion of GEA; constructed with culverts under the track to convey anticipated storm flows and to minimize ponding.</p>	<p>Floodplains: 130.4 ac (52.77 ha) direct/ 487.3 ac (197.21 ha) indirect</p> <p>Streams: 6,266 linear ft (1,909.9 linear m) direct/ 43,420 linear ft (13,234.4 linear m) indirect</p> <p>Lakes/Waterbodies: <u>2.3</u> (0.93 ha) direct/ 10.6 ac (4.29 ha) indirect</p> <p>Potentially affect same 44 unnamed and named water resources as Henry Miller (UPRR Connection).</p> <p>Primarily at-grade and adjacent to Henry Miller Road and elevated through portion of GEA; constructed with culverts under the track to convey anticipated storm flows and to minimize ponding.</p>



**Table 7.3-6  
Pacheco Pass Alternatives: San Luis Reservoir to UPRR or BNSF**

	<b>GEA North</b>	<b>Henry Miller (UPRR Connection)</b>	<b>Henry Miller (BNSF Connection)</b>
<b>Biological Resources Including Wetlands</b> Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	<p>Wetlands<sup>v</sup>: 17.96 ac (7.27 ha) direct/ 1,037.2 ac (419.75 ha) indirect</p> <p>Non-Wetland Waters: 6,771 linear ft (292.0 linear m)</p> <p>Species: 22 special-status plant and 34 special-status wildlife species</p> <p>This alignment alternative would impact the GEA and have potential to directly impact the least non-wetland waters and plant and wildlife species. This alignment alternative would have the potential to impact the most wetlands. Potential species impacts include succulent owl's clover, hairy orcutt grass, valley elderberry longhorn beetle, California tiger salamander, vernal pool tadpole shrimp, least Bell's vireo, riparian (San Joaquin Valley) woodrat, and San Joaquin kit fox. Potentially result in a barrier to wildlife movement. This alignment alternative would generally not follow transportation corridors.</p>	<p>Wetlands<sup>v</sup>: 11.61 ac (4.7 ha) direct/ 1,186.0 ac (479.96 ha) indirect</p> <p>Non-Wetland Waters: 10,588 linear ft (3,227.2 linear m)</p> <p>Species: 25 special-status plant and 34 special-status wildlife species</p> <p>This alignment alternative would impact the GEA and have potential to indirectly impact the most wetlands and impact the most non-wetland waters. Alignment alternative would also have the potential to impact the most plant and wildlife species. Potential species impacts include succulent owl's clover, hairy orcutt grass, Greene's tuctoria, valley elderberry longhorn beetle, vernal pool tadpole shrimp, least Bell's vireo, riparian (San Joaquin Valley) woodrat, and San Joaquin kit fox. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.</p>	<p>Wetlands<sup>v</sup>: 11.48 ac (4.65 ha) direct/ 1,185.0 ac (479.57 ha) indirect</p> <p>Non-Wetland Waters: 10,312 linear ft (3,143.1 linear m)</p> <p>Species: 25 special-status plant and 34 special-status wildlife species</p> <p>This alignment alternative would impact the GEA and have potential to indirectly impact the most wetlands. Alignment alternative would also have the potential to impact the most plant and wildlife species. Potential species impacts include succulent owl's clover, hairy orcutt grass, Greene's tuctoria, valley elderberry longhorn beetle, vernal pool tadpole shrimp, least Bell's vireo, riparian (San Joaquin Valley) woodrat, and San Joaquin kit fox. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.</p>
<b>Fault Crossings</b>	Ortigalita (Active) – At Grade Embankment	Ortigalita (Active) – At Grade	Ortigalita (Active) – At Grade
<b>Section 4(f) and 6(f) Resources:</b> <sup>4</sup> Number of resources rated high (potential direct effects)	Public parks, recreation lands, wildlife v waterfowl refuges within 0–150 ft (46 m) from center of alignment alternative include the San Luis National Wildlife Refuge, North Grasslands Wildlife Area, and Great Valley Grasslands State Park. Few potential direct impacts are anticipated given that much of the alignment alternative is within or directly adjacent to existing transportation rights-of-way.	Public parks, recreation lands, wildlife and waterfowl refuges within 0–150 ft (46 m) from center of alignment alternative include the Los Banos Wildlife Area. Few potential direct impacts are anticipated given that much of the alignment alternative is within or directly adjacent to existing transportation rights-of-way.	

## G. ALTAMONT PASS ALIGNMENT ALTERNATIVES (NILES CANYON TO ALTAMONT PASS)

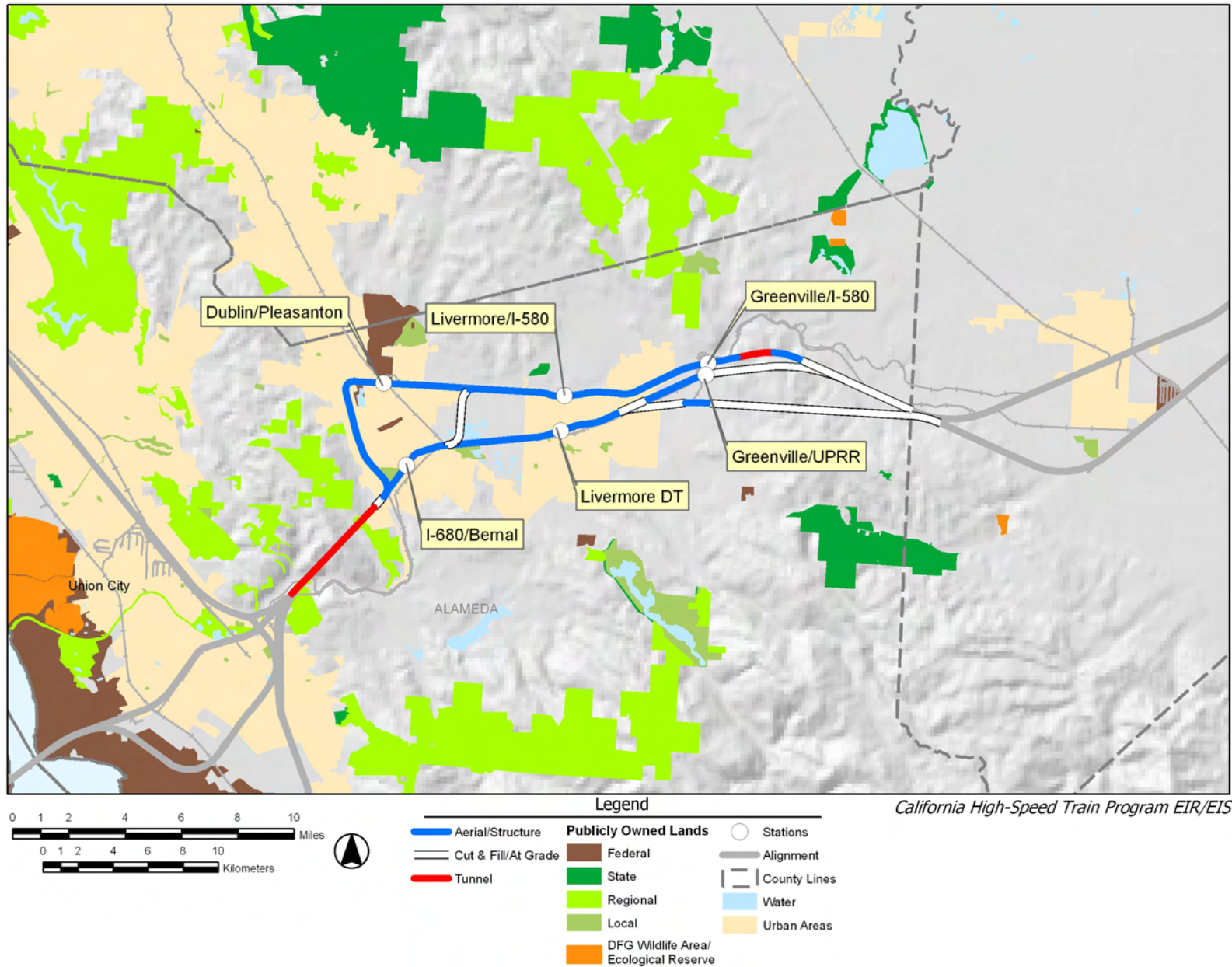
All information presented is for the area from Niles Canyon to the Altamont Pass. This alternative is shown in Figure 7.3-7 and described in Table 7.3-7.

**Table 7.3-7**  
**Altamont Pass Alignment Alternatives: Niles Canyon to Altamont Pass**

	<b>I-680/I-580/UPRR</b>	<b>I-580/UPRR</b>	<b>Patterson Pass/UPRR</b>	<b>UPRR</b>
<b>Physical/Operational Characteristics</b>				
<b>Alignment Alternative Description</b>	The I-680/I-580/UPRR alignment alternative would begin at Niles Canyon to Sunol, follow the I-680 Freeway, north and transition to the I-580 Freeway median east to Altamont Pass. Station options considered in this segment include Pleasanton (BART), Livermore (I-580), or Livermore (Greenville/I-580).	The I-580/UPRR alignment alternative would begin at Niles Canyon and would follow UPRR through Pleasanton, travel north to the I-580 and then to Altamont Pass. Station options would be at Pleasanton (I-680/Bernal Rd), or Livermore (I-580), or Livermore (Greenville/I-580).	The Patterson Pass/UPRR alignment alternative would begin at Niles Canyon and would follow the UPRR line to Patters Pass and then to the Central Valley. Station options considered in this segment include Pleasanton (I-680/Bernal Rd), or Livermore (Downtown), or Livermore (Greenville/UPRR).	The UPRR alignment alternative would begin at Niles Canyon and would follow the UPRR line through the Tri-Valley. Station options considered in this segment include Pleasanton (I-680/Bernal Rd), or Livermore (Downtown), or Livermore (Greenville/UPRR).
<b>Length</b>	30.71 mi (49.43 km)	27.32 mi (43.96 km)	25.60 mi (41.19 km)	25.86 mi (41.62 km)
<b>Cost (dollars)</b>	\$2.37 billion	\$2.0 billion	\$1.72 billion	\$1.68 billion
<b>Travel Time</b>	22 min	17 min	14 min	14 min
<b>Ridership</b>	Forecast to provide 1.6% less total ridership and 1.4% less total revenue than the UPRR alignment primarily as a result of longer travel times.	Would provide the slightly less ridership potential than alternatives using the UPRR alignment as a result of longer travel times.	Would provide high ridership and revenue potential through the Altamont Pass.	Would provide high ridership and revenue potential through the Altamont Pass.
<b>Constructability</b>	Would require extensive aerial structure along the I-580 and I-680 freeway and rail corridors with major constructability issues. A particularly long and high aerial curve would be	Would require extensive aerial structure along the I-580 freeway and rail corridor. Construction issues through downtown Pleasanton.	Would require extensive earthwork as compared to the UPRR alignment alternative. Construction issues through downtown Livermore and Pleasanton.	Construction issues through downtown Livermore and Pleasanton

**Table 7.3-7  
Altamont Pass Alignment Alternatives: Niles Canyon to Altamont Pass**

	<b>I-680/I-580/UPRR</b>	<b>I-580/UPRR</b>	<b>Patterson Pass/UPRR</b>	<b>UPRR</b>
	required from the I-580 to I-680 alignments.			
<b>Operational Issues</b>	<p>Average speed: 91.1 mph (151.8 kph)</p> <p>Maximum speed: 159 mph (265 kph)</p> <p>HST operations would need to be coordinated and integrated with BART.</p>	<p>Average speed: 97.8 mph (162.9 kph)</p> <p>Maximum speed: 159 mph (265 kph)</p> <p>HST operations would need to be coordinated and integrated with ACE service and UPRR operations.</p>	<p>Average speed: 105.8 mph (176.3 kph)</p> <p>Maximum speed: 171 mph (285 kph)</p> <p>HST operations would need to be coordinated and integrated with ACE service and UPRR operations.</p>	<p>Average speed: 108.3 mph (180.5 kph)</p> <p>Maximum speed: 168 mph (280 kph)</p> <p>HST operations would need to be coordinated and integrated with ACE service and UPRR operations.</p>
<b>Potential Environmental Impacts</b>				
<b>Travel Conditions</b>	<p>This alignment alternative would provide direct HST service to the Tri-Valley area with potential stations at the Pleasanton (BART), Livermore (I-580), or Livermore (Greenville/I-580). This alignment alternative would increase connectivity and accessibility to the I-580 Corridor and Tri-Valley area. The alignment alternative would provide a safer, more reliable, energy-efficient intercity mode along the I-580 Corridor while improving the safety, reliability, and performance of the regional commuter service. This alignment alternative would greatly increase the capacity for intercity and commuter travel and</p>	<p>This alignment alternative would provide direct HST service to the Tri-Valley area with potential stations at Pleasanton (I-680/Bernal Rd), or Livermore (I-580), or Livermore (Greenville/I-580). This alignment alternative would increase connectivity and accessibility to the I-580 Corridor and Tri-Valley area. The alignment alternative would provide a safer, more reliable, energy-efficient intercity mode along the I-580 Corridor while improving the safety, reliability, and performance of the regional commuter service. This alignment alternative would greatly increase the capacity for intercity and commuter travel and reduce existing</p>	<p>These alignment alternatives would provide generally equivalent service to the I-580/UPRR alignment alternative.</p>	



**Figure 7.3-7**  
**HST Alignment Alternatives**  
**Altamont Pass Alignment Alternatives**  
**(Niles Canyon to Altamont Pass)**



U.S. Department  
of Transportation  
**Federal Railroad  
Administration**





**Table 7.3-7**  
**Altamont Pass Alignment Alternatives: Niles Canyon to Altamont Pass**

	<b>I-680/I-580/UPRR</b>	<b>I-580/UPRR</b>	<b>Patterson Pass/UPRR</b>	<b>UPRR</b>
	reduce existing automobile traffic flow. The alignment alternative would provide connectivity to the BART station in Pleasanton.	automobile traffic flow and reduce air pollution at some existing rail crossings.		
<b>Noise and Vibration:</b> <sup>1</sup> High, medium, and low potential impacts	Low potential of noise impacts. Low potential of vibration impacts due to proximity of residential land use along the Tri-Valley segment. There would be an increase in noise levels due to increased frequency of trains. There would be a reduction in noise levels due to the elimination of horn noise and gate noise from existing services as a result of the grade separations at some existing grade crossings.	Low potential of noise impacts and low potential of vibration impacts due to proximity of alignment alternative to industrial/commercial land uses. There would be an increase in noise levels due to increased frequency of trains. There would be a reduction in noise levels due to the elimination of horn noise and gate noise from existing services as a result of the grade separations at some existing grade crossings.	Medium potential of noise impacts and a medium potential of vibration impacts due to proximity of residential land use along the Tri-Valley. There would be an increase in noise levels due to increased frequency of trains. There would be a reduction in noise levels due to the elimination of horn noise and gate noise from existing services as a result of the grade separations at some existing grade crossings.	Medium potential of noise impacts and a medium potential of vibration impacts due to proximity of residential land use along the Tri-Valley segment. There would be an increase in noise levels due to increased frequency of trains. There would be a reduction in noise levels due to the elimination of horn noise and gate noise from existing services as a result of the grade separations at some existing grade crossings.
<b>Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice</b>	<p>Compatibility: The majority of this alignment alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. It exhibits low compatibility where it does not follow a transportation right-of-way in the Altamont Pass area.</p> <p>Environmental Justice: This alignment alternative has low environmental justice impact rating.</p>	<p>Compatibility: The majority of this alignment alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way. It exhibits low compatibility where it does not follow a transportation right-of-way in the Altamont Pass area.</p> <p>Environmental Justice: This alignment alternative has low environmental justice impact rating.</p>	<p>Compatibility: The majority of these alignment alternatives are compatible (high rating), given that they are within or immediately adjacent to an existing major rail or highway rights-of-way. They exhibit low compatibility where they do not follow a transportation rights-of-way in the Altamont Pass area.</p> <p>Environmental Justice: These alignment alternatives have low environmental justice impact ratings.</p> <p>Community: These alignment alternatives would not affect community cohesion, given that they are mostly within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: These alignment alternatives have the potential for low to medium property impacts.</p>	

**Table 7.3-7  
Altamont Pass Alignment Alternatives: Niles Canyon to Altamont Pass**

	<b>I-680/I-580/UPRR</b>	<b>I-580/UPRR</b>	<b>Patterson Pass/UPRR</b>	<b>UPRR</b>
	<p>Community: This alignment alternative would not affect community cohesion, given that it is mostly within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: This alignment alternative has the potential for high property impacts in the Niles to Sunol area, Dublin /Pleasanton areas, where additional property will be required.,</p>	<p>Community: This alignment alternative would not affect community cohesion, given that it is mostly within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: This alignment alternative has the potential for medium property impacts.</p>		
<b>Aesthetics and Visual Resources:</b> General impacts and rating.	Includes a trench alignment from tunnel portal to I-680, an elevated alignment along I-680, an elevated alignment through I-680, I-580 interchange, elevated approaches to station, and an elevated crossing of I-580. Overall medium visual impact.	Include a trench alignment from tunnel portal to east of I-680, an elevated alignment along existing UPRR in Pleasanton, an at-grade alignment along existing UPRR through Livermore, and a deep cut at Altamont Summit. Overall medium visual impact.	Includes an aerial alignment from tunnel portal to east of I-680, an elevated alignment along existing UPRR in Pleasanton, and at-grade alignment along existing UPRR through Livermore, and cut and fill across summit. Overall low visual impact.	Includes a trench alignment from tunnel portal to east of I-680, an elevated alignment along existing UPRR in Pleasanton, an at-grade alignment along existing UPRR through Livermore, and a deep cut and fill across summit. Overall medium visual impact.
<b>Farmlands:</b> <sup>ii</sup> Ac (ha) potentially affected	<p>Farmland: 14 ac (5.5 ha)</p> <p>Would have greatest potential impacts on farmlands. Impact up to 11.7 ac (4.7 ha) of prime farmland.</p>	<p>Farmland: 12 ac (4.9 ha)</p> <p>Similar farmland impacts as the I-680/I-580/UPRR, but have the greatest impact on prime farmland. All farmland impact would be prime farmland.</p>	<p>Farmland: 10 ac (3.9 ha)</p> <p>Less potential for farmland impacts than either the I-680/I-580/UPRR or I-580/UPRR. Impact up to 7.1 ac (2.9 ha) of prime farmland.</p>	<p>Farmland: 7 ac (2.9 ha)</p> <p>Would have least potential impacts on farmlands including prime farmland. All farmland impact would be prime farmland.</p>

**Table 7.3-7**  
**Altamont Pass Alignment Alternatives: Niles Canyon to Altamont Pass**

	<b>I-680/I-580/UPRR</b>	<b>I-580/UPRR</b>	<b>Patterson Pass/UPRR</b>	<b>UPRR</b>
<b>Cultural Resources and Paleontological Resources:</b> <sup>iii</sup> Potential presence of historical resources in area of potential effect	<p>There are 20 known cultural resources.</p> <p>Much of the area has seen recent development. Architectural resources include buildings from the 1890s and residential properties dating from 1910 to 1940.</p>	<p>There are 17 known cultural resources.</p> <p>The Livermore Valley is known to be rich in prehistoric resources, including habitation sites and burials. Previously recorded resources include archaeological sites and architectural resources dating from the 1900s.</p>	<p>There are 6 known cultural resources.</p> <p>There are few previously recorded archaeological sites or architectural resources. This alignment alternative would have a low sensitivity for cultural resources.</p>	<p>There are 6 known cultural resources.</p> <p>There are few previously recorded archaeological sites or architectural resources. This alignment alternative would have a low sensitivity for cultural resources.</p>
<b>Hydrology and Water Resources:</b> <sup>iv</sup> Potential impacts and associated ac (ha) of floodplains, and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	<p>Floodplains: 3.7 ac (1.5 ha) direct/ 18.8 ac (7.61 ha) indirect</p> <p>Streams: 2,582 linear ft (787.3 linear m) direct/ 13,310 linear ft (4,056.9 linear m) indirect</p> <p>Lakes/Waterbodies: 0 ac (0.0 ha) direct/ 0.0 ac (0.0 ha) indirect</p> <p>Potentially affect at least 17 unnamed and named water resources, including Alameda Creek, Laurel Creek, Gold Creek, Arroyo Valle, Arroyo De La Laguna, Tassajara Creek, Cottonwood Creek, Arroyo Las Positas, Arroyo Seco, and South Bay Aqueduct. Constructed on aerial structure with the least amount of impact on floodplains.</p>	<p>Floodplains: 8.2 ac (3.32 ha) direct/ 33.7 ac (13.64 ha) indirect</p> <p>Streams: 2,280 linear ft (694.9 linear m) direct/ 9,243 linear ft (2,817.3 linear m) indirect</p> <p>Lakes/Waterbodies: 2.1 ac (0.85 ha) direct/ 7.5 ac (3.04 ha) indirect</p> <p>Potentially affect 15 unnamed and named water resources, including (i.e., not limited to) Arroyo Valle, Arroyo De La Laguna, Cottonwood Creek, Arroyo Las Positas, Arroyo Seco, Arroyo Gravel Pits/Arroyo Mocho, South Bay Aqueduct, and Patterson Run (canal). Constructed at-grade and potentially impact more area of floodplain.</p>	<p>Floodplains: 9.4 ac (3.8 ha) direct/ 20.6 ac (8.34 ha) indirect</p> <p>Streams: 1,861 linear ft (567.2 linear m) direct/ 6,253 linear ft (1,905.9 linear m) indirect</p> <p>Lakes/Waterbodies: 0.0 ac (0.0 ha) direct/ 0.0 ac (0.0ha) indirect</p> <p>Potentially affect 9 unnamed and named water resources, including Arroyo Valle, Arroyo De La Laguna, Arroyo Las Positas, Arroyo Seco, Arroyo Gravel Pits/Arroyo Mocho, and South Bay Aqueduct and Patterson Run (canal). Constructed on aerial structure through most of the areas within the 100-year floodplain and would not impede storm flows.</p>	<p>Floodplains: 7 ac (2.83ha) direct/ 16.2 ac (6.56 ha) indirect</p> <p>Streams: 1,957 linear ft (596.5 linear m) direct/ 6,195 linear ft (1,888.2 linear m) indirect</p> <p>Lakes/Waterbodies: 0.0 ac (0.0 ha) direct/ 0.0 ac (0.0 ha)) indirect</p> <p>Potentially affect 12 unnamed and named water resources, including Alameda Creek, Arroyo Valle, Arroyo De La Laguna, Arroyo Las Positas, Arroyo Seco, Arroyo Gravel Pits/Arroyo Mocho, South Bay Aqueduct, and Patterson Run (canal). Many of the watercourses would be crossed at-grade.</p>

**Table 7.3-7  
Altamont Pass Alignment Alternatives: Niles Canyon to Altamont Pass**

	<b>I-680/I-580/UPRR</b>	<b>I-580/UPRR</b>	<b>Patterson Pass/UPRR</b>	<b>UPRR</b>
<b>Biological Resources Including Wetlands</b> Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	<p>Wetlands<sup>v</sup>: 0.66 ac (0.27 ha) direct/ 72.1 ac (29.19 ha) indirect</p> <p>Non-Wetland Waters: 2,380 linear ft (725.4 linear m)</p> <p>Species: 24 special-status plant and 29 special-status wildlife species</p> <p>This alignment alternative would have potential to directly impact the least wetlands, but the most plant and wildlife species. Potential species impacts include palmate-bracted bird's beak, longhorn fairy shrimp, valley elderberry longhorn beetle, vernal pool tadpole shrimp, and San Joaquin kit fox. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.</p>	<p>Wetlands<sup>v</sup>: 5.17 ac (2.1 ha) direct/ 226.3 ac (91.57 ha) indirect</p> <p>Non-Wetland Waters: 2,612 linear ft (796.1 linear m)</p> <p>Species: 24 special-status plant and 29 special-status wildlife species</p> <p>This alignment alternative would have potential to directly impact the most wetlands, non-wetland waters, and plant and wildlife species. Potential species impacts include palmate-bracted bird's beak, longhorn fairy shrimp, valley elderberry longhorn beetle, vernal pool tadpole shrimp, and San Joaquin kit fox. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.</p>	<p>Wetlands<sup>v</sup>: 2.59 ac (1.0 ha) direct/ 160.1 ac (64.78 ha) indirect</p> <p>Non-Wetland Waters: 1,371 linear ft (417.9 linear m)</p> <p>Species: 20 special-status plant and 28 special-status wildlife species</p> <p>This alignment alternative would have potential to impact the least plant and wildlife species. Potential species impacts include palmate-bracted bird's beak, valley elderberry longhorn beetle, vernal pool tadpole shrimp, and San Joaquin kit fox. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.</p>	<p>Wetlands<sup>v</sup>: 3.22 ac (1.3 ha) direct/ 184 ac (74.46 ha) indirect</p> <p>Non-Wetland Waters: 1,152 linear ft (351.1 linear m)</p> <p>Species: 20 special-status plant and 28 special-status wildlife species</p> <p>This alignment alternative would have potential to directly impact the least non-wetland waters and plant and wildlife species. Potential species impacts include valley elderberry longhorn beetle, vernal pool tadpole shrimp, and San Joaquin kit fox. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.</p>
<b>Fault Crossings</b>	<p>Calaveras (Active) – Tunnel</p> <p>Pleasanton (Active) – Above Grade</p> <p>Livermore (Potentially Active) – Above Grade</p> <p>Greenville (Active) – Above Grade</p>	<p>Calaveras (Active) – Tunnel</p> <p>Livermore (Potentially Active) – Above Grade</p> <p>Greenville (Active) – Above Grade</p>	<p>Calaveras (Active) – Tunnel</p> <p>Livermore (Potentially Active) – Above Grade</p> <p>Greenville (Active) – Above Grade</p> <p>Corral Hollow (Potentially Active) – At Grade</p>	<p>Calaveras (Active) – Tunnel</p> <p>Livermore (Potentially Active) – Above Grade</p> <p>Greenville (Active) – Above Grade</p>

**Table 7.3-7**  
**Altamont Pass Alignment Alternatives: Niles Canyon to Altamont Pass**

	<b>I-680/I-580/UPRR</b>	<b>I-580/UPRR</b>	<b>Patterson Pass/UPRR</b>	<b>UPRR</b>
<b>Section 4(f) and 6(f) Resources:</b> <sup>4</sup> Number of resources rated high (potential direct effects)	<p>Public parks, recreation lands, wildlife and waterfowl refuges 0–150 ft (46 m) from center of alignment alternative include (1) Augustin-Bernal Park, (2) Muirwood Park, (3) Dublin Sports Grounds Park, (4) Iron Horse Trail, (5) Vargas Plateau, (6) Bay Ridge Trail, (7) Pleasanton Ridge, and (8) San Joaquin County to Shadow Cliffs Trail. Few potential direct impacts are anticipated given that much of the alignment alternative is within or directly adjacent to existing transportation rights-of-way, and few resources exist in areas where the alignment alternative is not adjacent to or within this existing right-of-way. Exceptions include the Augustin-Bernal Park.</p>	<p>Public parks, recreation lands, wildlife and waterfowl refuges 0–150 ft (46 m) from center of alignment alternative include (1) Augustin-Bernal Park, (2) Iron Horse Trail, (3) Vargas Plateau, (4) Bay Ridge Trail, (5) Pleasanton Ridge, and (6) San Joaquin County to Shadow Cliffs Trail. Few potential direct impacts are anticipated given that much of the alignment alternative is within or directly adjacent to existing transportation rights-of-way, and few resources exist in areas where the alignment alternative is not adjacent to or within this existing right-of-way. Exceptions include the Augustin-Bernal Park.</p>		

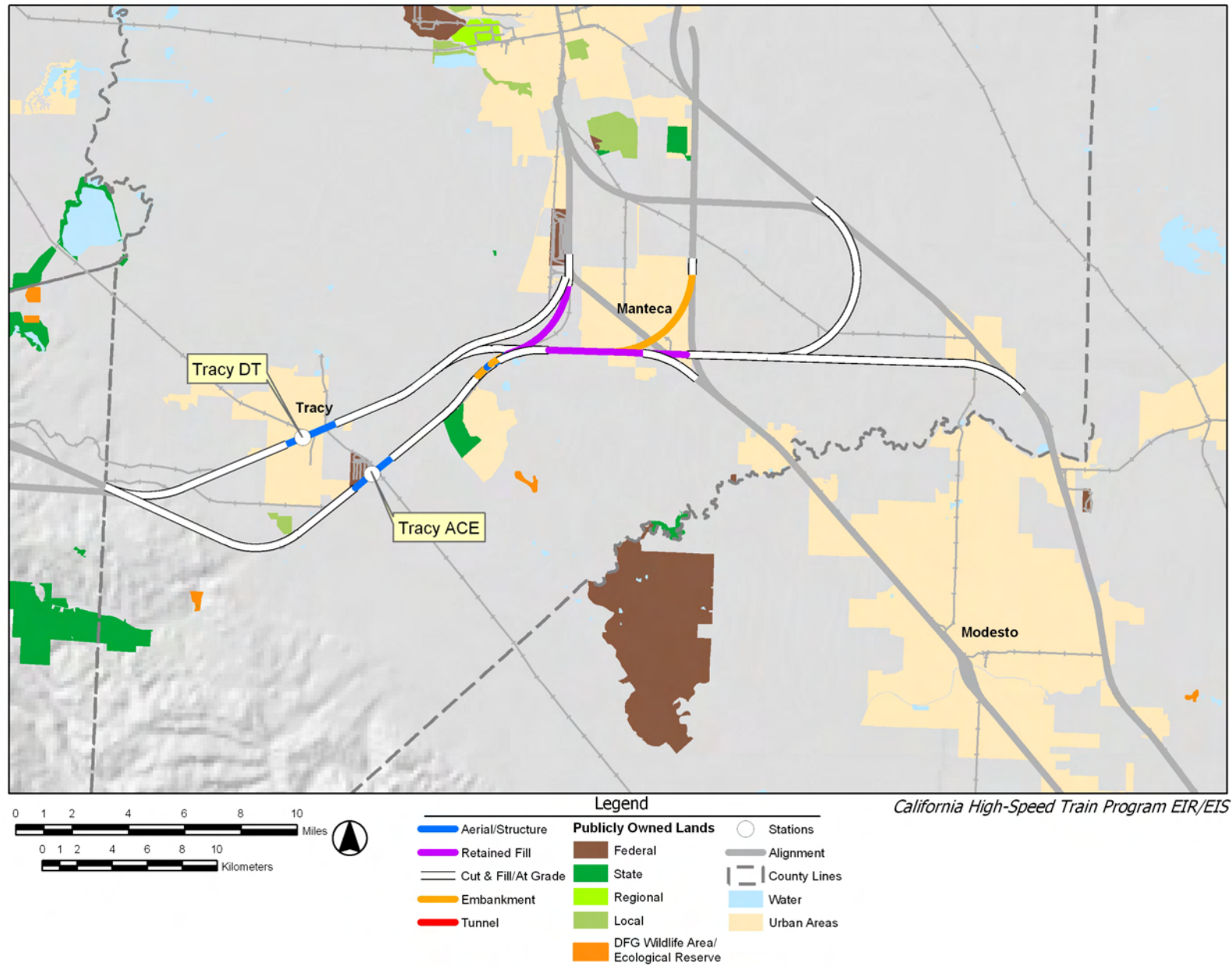


## H. ALTAMONT PASS ALIGNMENT ALTERNATIVES (ALTAMONT PASS TO UPRR OR BNSF CONNECTION)

All information presented is for the area from the Altamont Pass to the UPRR or BNSF connection. This alternative is shown in Figure 7.3-8 and described in Table 7.3-8.

**Table 7.3-8**  
**Altamont Pass Alignment Alternatives: Altamont Pass to UPRR or BNSF Connection**

	Tracy Downtown (BNSF Connection)	Tracy Downtown (UPRR Connection)	Tracy ACE (BNSF Connection)	Tracy ACE (UPRR Connection)
<b>Physical/Operational Characteristics</b>				
<b>Alignment Alternative Description</b>	The I-680/I-580/UPRR alignment alternative would begin at the Altamont Pass, traverse the Pass south of I-580, and parallel the UPRR line in Tracy to Downtown, with connections east of Tracy to the BNSF N/S line. The station option considered in this segment is Tracy (Downtown).	The I-680/I-580/UPRR alignment alternative would begin at the Altamont Pass, traverse the Pass south of I-580, and parallel the UPRR line in Tracy to Downtown, with connections east of Tracy to the UPRR N/S line. The station option considered in this segment is Tracy (Downtown).	The Patterson Pass/UPRR alignment alternative would begin at the Altamont Pass and would travel southeast along the southern UPRR line (ACE Line) to the Tracy ACE station, with connections east to the BNSF N/S line. The station option considered in this segment is Tracy (ACE).	The Patterson Pass/UPRR alignment alternative would begin at the Altamont Pass and would travel southeast along the southern UPRR line (ACE Line) to the Tracy ACE station, with connections east to the UPRR N/S line. The station option considered in this segment is Tracy (ACE).
<b>Length</b>	53.58 mi (86.22 km)	36.26 mi (58.36 km)	53.98 mi (86.87 km)	29.78 mi (47.93 km)
<b>Cost (dollars)</b>	\$1.84 billion	\$1.93 billion	\$1.95 billion	\$1.75 billion
<b>Travel Time</b>	14 min NB 15 min SB	12 min NB 11 min SB	15 min NB 16 min SB	13 min NB 12 min SB
<b>Ridership</b>	Longer travel times would result in somewhat less ridership potential than the UPRR Alternatives. Tracy Downtown and Tracy ACE alternatives using the BNSF would be about the same.	Would provide high ridership and revenue potential for the Altamont Pass Alternatives. Tracy Downtown and Tracy Ace alternatives using the UPRR would be about the same.	Increased travel times would result in somewhat less ridership potential than UPRR Alternatives.	Would provide high ridership and revenue potential via the Altamont Pass.
<b>Constructability</b>	Primarily at-grade alignment with extensive earthwork at western end.	Primarily at-grade alignment with extensive earthwork at western end.	Primarily at-grade alignment with extensive earthwork at western end.	Primarily at-grade alignment with extensive earthwork at western end.



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**Figure 7.3-8**  
**HST Alignment Alternatives**  
**Altamont Pass Alignment Alternatives**  
**(Altamont Pass to UPRR OR BNSF Connection)**



**Table 7.3-8**  
**Altamont Pass Alignment Alternatives: Altamont Pass to UPRR or BNSF Connection**

	<b>Tracy Downtown (BNSF Connection)</b>	<b>Tracy Downtown (UPRR Connection)</b>	<b>Tracy ACE (BNSF Connection)</b>	<b>Tracy ACE (UPRR Connection)</b>
<b>Operational Issues</b>	<p>Northbound</p> <p>Average speed 135.5 mph (225.9 kph)</p> <p>Maximum speed: 210 mph (350 kph)</p> <p>Southbound</p> <p>Average speed: 141.9 mph (236.5 kph)</p> <p>Maximum speed: 210 mph (350 kph)</p>	<p>Northbound</p> <p>Average speed: 127.2 mph (212 kph)</p> <p>Maximum speed: 210 mph (350 kph)</p> <p>Southbound</p> <p>Average speed: 125.29 mph (208.7 kph)</p> <p>Maximum speed: 210 mph (350 kph)</p>	<p>Northbound</p> <p>Average speed: 136.1 mph (226.8 kph)</p> <p>Maximum speed: 210 mph (350 kph)</p> <p>Southbound</p> <p>Average speed: 147.7 mph (237.8 kph)</p> <p>Maximum speed: 210 mph (350 kph)</p>	<p>Northbound</p> <p>Average speed: 131.7 mph (219.6 kph)</p> <p>Maximum speed: 210 mph (350 kph)</p> <p>Southbound</p> <p>Average speed: 125.8 mph (209.7 kph)</p> <p>Maximum speed: 210 mph (350 kph)</p>
<b>Potential Environmental Impacts</b>				
<b>Travel Conditions</b>	<p>This alignment alternative would provide direct HST service to downtown Tracy. The alignment alternative would provide a safer, more reliable, energy-efficient intercity mode along the I-580 Corridor while improving the safety, reliability, and performance of the regional commuter service. This alignment alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic flow and reduce air pollution at existing rail crossings. The fully grade-separated UPRR rail corridor in the Tracy Area would improve local traffic.</p>		<p>This alignment alternative would provide direct HST service to southern Tracy area at the current ACE Station. The alignment alternative would provide a safer, more reliable, energy-efficient intercity mode along the I-580 Corridor while improving the safety, reliability, and performance of the regional commuter service. This alignment alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic flow and reduce air pollution at existing rail crossings.</p>	
<b>Noise and Vibration:</b> <sup>i</sup> High, medium, and low potential impacts	<p>Low potential of noise impacts.</p> <p>Low potential of vibration impacts due to proximity of residential land use along the Tri-Valley segment. There would be an increase in noise levels due to increased frequency of trains. There would be a reduction in noise levels</p>	<p>Low potential of noise impacts.</p> <p>Low potential of vibration impacts due to proximity of alignment to industrial/commercial land uses. There would be an increase in noise levels due to increased frequency of trains. There would be a reduction in noise levels due</p>	<p>Medium potential of noise impacts.</p> <p>Low potential of vibration impacts due to proximity of residential land use along the Tri-Valley. There would be an increase in noise levels due to increased frequency of trains. There would be a reduction in noise levels due to the elimination of horn noise and</p>	<p>Medium potential of noise impacts.</p> <p>Low potential of vibration impacts due to proximity of residential land use along the Tri-Valley segment. There would be an increase in noise levels due to increased frequency of trains. There would be a reduction in noise levels due</p>

**Table 7.3-8**  
**Altamont Pass Alignment Alternatives: Altamont Pass to UPRR or BNSF Connection**

	<b>Tracy Downtown (BNSF Connection)</b>	<b>Tracy Downtown (UPRR Connection)</b>	<b>Tracy ACE (BNSF Connection)</b>	<b>Tracy ACE (UPRR Connection)</b>
	due to the elimination of horn noise and gate noise from existing services as a result of the grade separations at some existing grade crossings.	to the elimination of horn noise and gate noise from existing services as a result of the grade separations at some existing grade crossings.	gate noise from existing services as a result of the grade separations at some existing grade crossings.	to the elimination of horn noise and gate noise from existing services as a result of the grade separations at some existing grade crossings.
<b>Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice</b>	<p>Compatibility: The majority of this alignment alternative is compatible (medium rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Environmental Justice: This alignment alternative has a low environmental justice impact rating.</p> <p>Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: This alignment alternative has the potential for low to medium property impacts.</p>	<p>Compatibility: The majority of this alignment alternative is compatible (medium rating), given that it is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Environmental Justice: This alignment alternative has a low environmental justice impact rating.</p> <p>Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: This alignment alternative has the potential for low to medium property impacts.</p>	<p>Compatibility: The majority of these alignment alternatives are compatible (medium rating), given that they are within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Environmental Justice: These alignment alternatives have a low environmental justice impact rating.</p> <p>Community: These alignment alternatives would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: These alignment alternatives have the potential for low to medium property impacts.</p>	



**Table 7.3-8**  
**Altamont Pass Alignment Alternatives: Altamont Pass to UPRR or BNSF Connection**

	<b>Tracy Downtown (BNSF Connection)</b>	<b>Tracy Downtown (UPRR Connection)</b>	<b>Tracy ACE (BNSF Connection)</b>	<b>Tracy ACE (UPRR Connection)</b>
<b>Aesthetics and Visual Resources:</b> General impacts and rating.	Includes a new at-grade corridor from summit to I-580, an elevated crossing of I-580, an at-grade alignment through Tracy, an at-grade alignment in median of SR 120, and a new at-grade corridor from SR 99 to BNSF. Overall low visual impact.	Includes a new at-grade corridor from summit to I-580, and elevated crossing of I-580, an at-grade alignment through Tracy, and an at-grade alignment in median of SR 120. Overall low visual impact.	Includes a new at-grade corridor from summit to I-580, an elevated crossing of I-580, an at-grade alignment along UPRR, an at-grade alignment in median of SR 120, and a new at-grade corridor from SR 99 to BNSF. Overall low visual impact.	Includes a new at-grade corridor from summit to I-580, an elevated crossing of I-580, an at-grade alignment along UPRR, and an at-grade alignment in median of SR 120. Overall low visual impact.
<b>Farmlands:</b> <sup>ii</sup> Ac (ha) potentially affected	Farmland: 446 ac (180.5 ha)  Would have greatest potential impacts on farmlands including prime farmland. Impact up to 204 ac (82.4 ha) of prime farmland.	Farmland: 243 ac (98.2 ha)  Less potential for farmland impacts than either the Tracy Downtown (BNSF Connection) or Tracy ACE (BNSF Connection). Impact up to 152 ac (61.4 ha) of prime farmland.	Farmland: 442 ac (178.7 ha)  Similar farmland impacts as the Tracy Downtown (BNSF Connection). Impact up to 162 ac (65.6 ha) of prime farmland.	Farmland: 182 ac (73.6 ha)  Would have least potential impacts on farmlands including prime farmland. Impact up to 87 ac (35.2 ha) of prime farmland.
<b>Cultural Resources and Paleontological Resources:</b> <sup>iii</sup> Potential presence of historical resources in area of potential effect	There are 14 known cultural resources.  Includes previously recorded archaeological and architectural resources. The majority of the architectural resources are located south of Tracy.	There are 11 known cultural resources.  Includes previously recorded archaeological and architectural resources, including a railroad trestle, industrial warehouses, and residential properties. The majority of the architectural resources are located south of Tracy.	There are 15 known cultural resources.  Includes previously recorded archaeological and architectural resources. Recorded resources include World War II era buildings. The majority of the architectural resources are located south of Lathrop.	There are 12 known cultural resources.  This alignment alternative includes previously recorded archaeological and architectural resources. Recorded resources include World War II era buildings. The majority of the architectural resources are located south of Lathrop.

**Table 7.3-8**  
**Altamont Pass Alignment Alternatives: Altamont Pass to UPRR or BNSF Connection**

	<b>Tracy Downtown (BNSF Connection)</b>	<b>Tracy Downtown (UPRR Connection)</b>	<b>Tracy ACE (BNSF Connection)</b>	<b>Tracy ACE (UPRR Connection)</b>
<b>Hydrology and Water Resources:</b> <sup>iv</sup> Potential impacts and associated ac (ha) of floodplains, and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	<p>Floodplains: 41.4 ac (16.75 ha) direct/ 136 ac (55.04 ha) indirect</p> <p>Streams: 6,228 linear ft (1,898.3 linear m) direct/ 19,257 linear ft (5,869.5 linear m) indirect</p> <p>Lakes/Waterbodies: 2.3 ac (0.93ha) direct/ 7.6 ac (3.08 ha) indirect</p> <p>Potentially affect at least 14 unnamed and named water resources, including California Aqueduct, Delta Mendota Canal, Upper Main Canal, San Joaquin River, Paradise Cut, Tom Paine Slough, Lone Tree Creek, and Avena Drain. Where either at-grade or on embankments, construction would include culverts sized appropriately to convey anticipated storm flows and to minimize ponding.</p>	<p>Floodplains: 32 ac (12.95 ha) direct/ 99.6 ac (40.31 ha) indirect</p> <p>Streams: 5,384 linear ft (1,641.0 linear m) direct/ 15,605 linear ft (4,756.4 linear m) indirect</p> <p>Lakes/Waterbodies: 2.3 ac (0.93 ha) direct/ 7.6 ac (3.08 ha) indirect</p> <p>Potentially affect at least 9 of the water resources identified in the Tracy Downtown (BNSF Connection) alignment alternative, excluding Lone Tree Creek, Avena Drain, and the Main Drain Canal. Where either at-grade or on embankments, construction would include culverts sized appropriately to convey anticipated storm flows and to minimize ponding.</p>	<p>Floodplains: 48.9 ac (19.79 ha) direct/ 154.5 ac 962.53 ha) indirect</p> <p>Streams: 7,390 linear ft (2,252.5 linear m) direct/ 24,468 linear ft (7,457.8 linear m) indirect</p> <p>Lakes/Waterbodies: 3 ac (1.2 ha) direct/ 13 ac (5.26 ha) indirect</p> <p>Potentially affect at least 14 unnamed and named water resources, including California Aqueduct, Delta Mendota Canal, Upper Main Canal, San Joaquin River, Paradise Cut, Tom Paine Slough, Lone Tree Creek, and Avena Drain. Where either at-grade or on embankments, construction would include culverts sized appropriately to convey anticipated storm flows and to minimize ponding.</p>	<p>Floodplains: 29.3 ac (11.86 ha) direct/ 76.8 ac (31.08 ha) indirect</p> <p>Streams: 5,433 linear ft (1,656.0 linear m) direct/ 13,161 linear ft (4,011.5 linear m) indirect</p> <p>Lakes/Waterbodies: 2.1 ac (0.85 ha) direct/ 9.2 ac (3.72 ha) indirect</p> <p>Potentially affect at least 9 of the water resources identified in the Tracy ACE Station BNSF alignment alternative, excluding Lone Tree Creek, Avena Drain, and the Main Drain Canal. Where either at-grade or on embankments, construction would include culverts sized appropriately to convey anticipated storm flows and to minimize ponding.</p>

**Table 7.3-8**  
**Altamont Pass Alignment Alternatives: Altamont Pass to UPRR or BNSF Connection**

	Tracy Downtown (BNSF Connection)	Tracy Downtown (UPRR Connection)	Tracy ACE (BNSF Connection)	Tracy ACE (UPRR Connection)
<b>Biological Resources Including Wetlands</b> Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	Wetlands <sup>v</sup> : 4.36 ac (1.76 ha) direct/ 158.2 ac (64.02 ha) indirect Non-Wetland Waters: 6,291 linear ft (1,917.5 linear m) Species: 18 special-status plant and 27 special-status wildlife species This alignment alternative would have potential to directly impact the most wetlands. Potential species impacts include valley elderberry longhorn beetle, vernal pool tadpole shrimp, riparian (San Joaquin Valley) woodrat, riparian brush rabbit, and San Joaquin kit fox. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.	Wetlands <sup>v</sup> : 4.16 ac (1.68 ha) direct/ 155.4 ac (62.91 ha) indirect Non-Wetland Waters: 7,504 linear ft (2,287.2 linear m) Species: 22 special-status plant and 27 special-status wildlife species This alignment alternative would have potential to impact the most plant species. Potential species impacts include Greene's tuctoria, valley elderberry longhorn beetle, vernal pool tadpole shrimp, riparian (San Joaquin Valley) woodrat, riparian brush rabbit, and San Joaquin kit fox. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.	Wetlands <sup>v</sup> : 3.63 ac (1.47 ha) direct/ 312.2 ac (126.33 ha) indirect Non-Wetland Waters: 7,678 linear ft (2,340.3 linear m) Species: 21 special-status plant and 27 special-status wildlife species This alignment alternative would have potential to indirectly impact the most wetlands and waters. Potential species impacts include Greene's tuctoria, valley elderberry longhorn beetle, vernal pool tadpole shrimp, riparian (San Joaquin Valley) woodrat, riparian brush rabbit, and San Joaquin kit fox. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.	Wetlands <sup>v</sup> : 2.60 ac (1.0 ha) direct/ 206.0 ac (83.37 ha) indirect Non-Wetland Waters: 5,326 linear ft (1,623.4 linear m) Species: 20 special-status plant and 27 special-status wildlife species This alignment alternative would have potential to directly impact the least wetlands and waters. Potential species impacts include valley elderberry longhorn beetle, vernal pool tadpole shrimp, riparian (San Joaquin Valley) woodrat, riparian brush rabbit, and San Joaquin kit fox. Potentially result in a barrier to wildlife movement. Placement along transportation corridors would minimize impacts.
<b>Fault Crossings</b>	Vernalis (Active) – At Grade		Vernalis (Active) – At Grade San Joaquin (Potentially Active) – At Grade	
<b>Section 4(f) and 6(f) Resources:</b> <sup>4</sup> Number of resources rated high (potential direct effects)	No public parks, recreation lands, wildlife and waterfowl refuges within 0–150 ft (46 m) from center of alignment alternative.			

## I. TRANS BAY CROSSING: TRANSBAY TUBE (OAKLAND - SAN FRANCISCO)

All information presented is for a potential transbay tube connection Oakland and San Francisco. This alternative is shown in Figure 7.3-9 and described in Table 7.3-9.

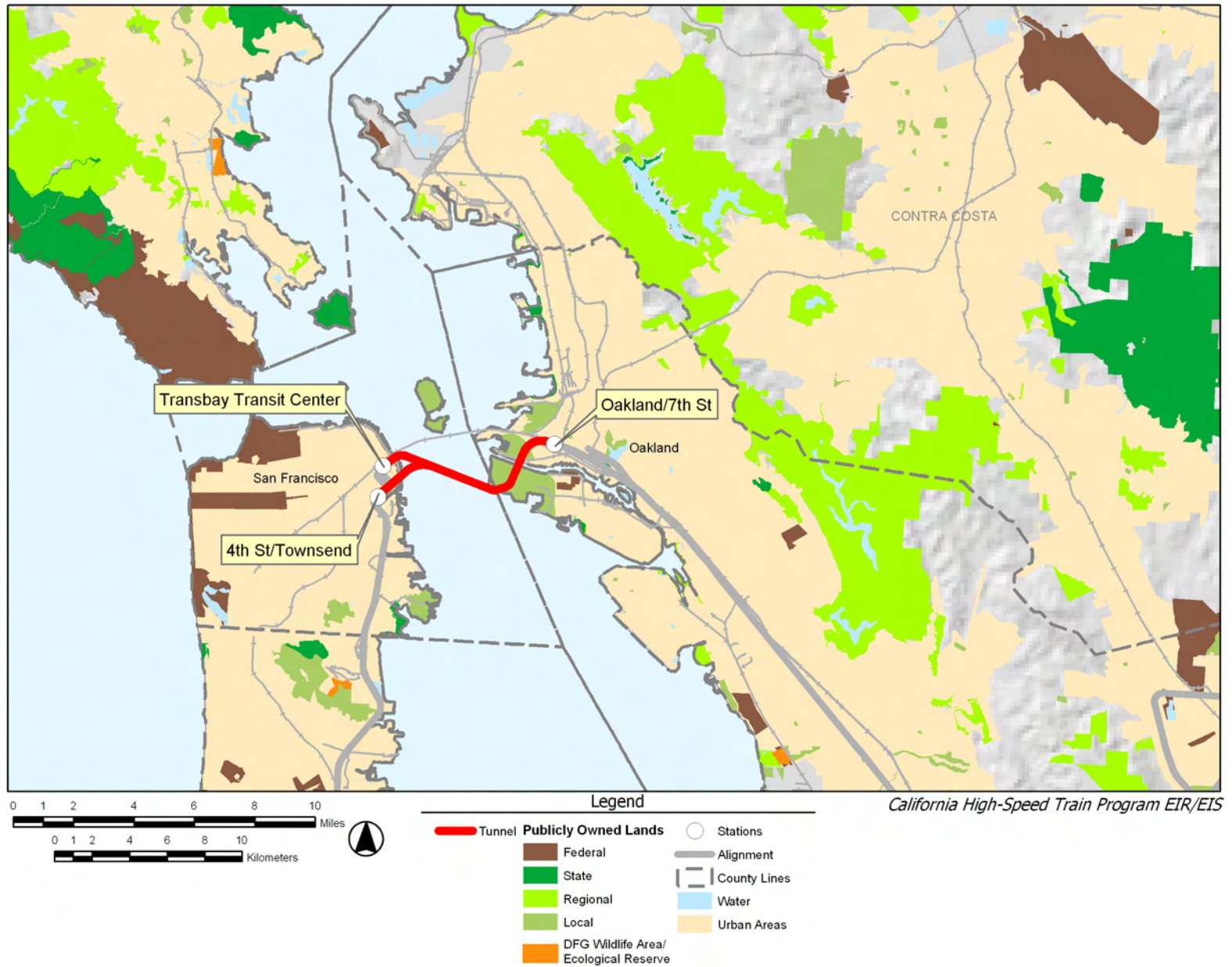
**Table 7.3-9**  
**Trans Bay Crossings: Oakland to San Francisco**

	Tran Bay Crossing – Transbay Transit Center	Trans Bay Crossing – 4 <sup>th</sup> and King
<b>Physical/Operational Characteristics</b>		
<b>Alignment Alternative Description</b>	This alignment alternative would be in a tube under the San Francisco Bay between San Francisco and Oakland. It would connect between Oakland and the Transbay Transit Center.	This alignment alternative would be in a tube under the San Francisco Bay between San Francisco and Oakland. It would connect between Oakland and the potential 4 <sup>th</sup> and King Station in San Francisco.
<b>Length<sup>24</sup></b>	7.28 mi (11.71 km)	6.87 mi (11.06 km)
<b>Cost<sup>25</sup> (dollars)</b>	\$5.36 billion	\$5.20 billion
<b>Travel Time<sup>26</sup></b>	6 min	6 min
<b>Ridership</b>	Would have the highest ridership potential for the Trans Bay crossing between San Francisco and Oakland.	Would have less ridership potential than the Transbay – Transbay Transit Center alternative.
<b>Constructability</b>	Difficult and costly construction on Bay floor.	Difficult and costly construction on Bay floor.
<b>Operational Issues</b>	Average speed = 66.5 mph (110.9 kph) Maximum speed = 100.2 mph (167 kph)	Average speed = 69.3 mph (115.5 kph) Maximum speed = 105 mph (175 kph)
<b>Potential Environmental Impacts</b>		
<b>Travel Conditions</b>	Travel time for this connection would be about the same as to 4 <sup>th</sup> and King. This alternative would provide the highest connectivity and accessibility with the terminus at the Transbay Transit Center.	Travel time for this connection would be about the same as the Transbay Transit Center.
<b>Noise and Vibration:<sup>i</sup> High, medium, or low potential impacts</b>	Low potential of noise impacts. Low potential of vibration impacts.	Low potential of noise impacts. Low potential of vibration impacts.

<sup>24</sup> Includes West Oakland terminal station.

<sup>25</sup> Includes West Oakland terminal station.

<sup>26</sup> Includes West Oakland terminal station.



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**Figure 7.3-9**  
**HST Alignment Alternatives**  
**Trans Bay Crossing**  
**(Oakland to San Francisco)**





**Table 7.3-9  
Trans Bay Crossings: Oakland to San Francisco**

	<b>Tran Bay Crossing – Transbay Transit Center</b>	<b>Trans Bay Crossing – 4<sup>th</sup> and King</b>
<b>Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice</b>	<p>Compatibility: The majority of this alignment alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail and within industrial land uses.</p> <p>Environmental Justice: This alignment alternative has medium environmental justice impact rating.</p> <p>Community: This alignment alternative would not affect community cohesion, given that it is in tunnel.</p> <p>Property: The potential for property impacts in this alignment alternative would be low to residential and nonresidential properties because it would be below grade.</p>	<p>Compatibility: The majority of this alignment alternative is compatible (high rating), given that it is within or immediately adjacent to an existing major rail and within industrial land uses.</p> <p>Environmental Justice: This alignment alternative has medium environmental justice impact rating.</p> <p>Community: This alignment alternative would not affect community cohesion, given that it is in tunnel.</p> <p>Property: The potential for property impacts in this alignment alternative would be low to residential and nonresidential properties because alignment would be below grade.</p>
<b>Aesthetics and Visual Resources:</b> General impacts and rating.	Underground alignment. No visual impact.	
<b>Cultural Resources and Paleontological Resources:</b> <sup>iii</sup> Potential presence of historical resources in area of potential effect	<p>There are 3 known cultural resources.</p> <p>The terrestrial portions are highly sensitive for both historical archaeological deposits and architectural resources. The area likely includes historic artifacts from the Gold Rush period through the 1906 earthquake and fire.</p>	<p>There are no known cultural resources.</p> <p>The terrestrial portions are highly sensitive for both historical archaeological deposits and architectural resources. The area likely includes historic artifacts from the Gold Rush period through the 1906 earthquake and fire.</p>
<b>Hydrology and Water Resources:</b> <sup>iv</sup> Potential impacts and associated ac (ha) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	<p>Floodplains: 0.0 ac (0.0 ha) direct/ 0.0 ac (0.0 ha) indirect</p> <p>Streams: 0.0 linear ft (0.0 m) direct/ 0.0 linear ft (0.0 linear m) indirect</p> <p>Lakes/Waterbodies: 36.5 ac (14.77 h) direct/ 235.5 ac (95.31 ha) indirect</p> <p>Extend from the Oakland Inner Harbor to the city of San Francisco, crossing San Francisco Bay and impacting the most area of the Bay. Coordination would be required with the USACE under Section 10 of the Rivers and Harbors Act and the California Coastal Commission.</p>	<p>Floodplains: 0.0 ac (0.0 ha) direct/ 0.0 ac (0.0 ha) indirect</p> <p>Streams: 0.0 linear ft (0.0 m) direct/ 0.0 linear ft (0.0 linear m) indirect</p> <p>Lakes/Waterbodies: 35.4 ac (14.33 h) direct/ 228 ac (92.27 ha) indirect</p> <p>Extend from the Oakland Inner Harbor to the city of San Francisco, crossing San Francisco Bay and impact less area of the Bay. Coordination would be required with the USACE under Section 10 of the Rivers and Harbors Act and the California Coastal Commission.</p>

**Table 7.3-9  
Trans Bay Crossings: Oakland to San Francisco**

	<b>Tran Bay Crossing – Transbay Transit Center</b>	<b>Trans Bay Crossing – 4<sup>th</sup> and King</b>
<b>Biological Resources Including Wetlands</b> Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	<p>Wetlands<sup>v</sup>: 22.8 ac (9.24 ha) direct/ 1,366.3 (552.94 ha) indirect</p> <p>Bay Waters: 22.1 ac (8.94 ha)</p> <p>Species: 1 special-status plant species</p> <p>This alignment alternative would have the potential to affect more wetlands, Bay waters, and the sensitive eel grass habitat. Sensitive plant species include the beach layia. Crossing of the Bay would be subject to USACE, CDFG, and BCDC permit process.</p>	<p>Wetlands<sup>v</sup>: 22.0 ac (8.92 ha) direct/ 1,286.5 ac (520.65 ha) indirect</p> <p>Bay Waters: 20.07 ac (8.12 ha)</p> <p>Species: 1 special-status plant species</p> <p>This alignment alternative would have the potential to affect slightly less wetlands and Bay waters. Potential impacts to sensitive eel grass habitat. Sensitive plant species include the beach layia. Crossing of the Bay would be subject to USACE, CDFG, and BCDC permit process.</p>
<b>Fault Crossings</b>	None	
<b>Section 4(f) and 6(f) Resources:</b> <sup>4</sup> Number of resources rated high potential direct effects	Public parks, recreation lands, wildlife and waterfowl refuges within 0–150 ft (46 m) from center of alignment alternative include South Park. Few direct impacts are anticipated given that the alignment would be in tunnel as it passes South Park.	No public parks, recreation lands, wildlife and waterfowl refuges within 0–150 ft (46 m) from center of alignment alternative.

## J. TRANS BAY CROSSING: DUMBARTON BRIDGE OR TUBE

All information presented is for a potential Dumbarton bridge or transbay tube. This alternative is shown in Figure 7.3-10 and described in Table 7.3-10.

**Table 7.3-10**  
**Trans Bay Crossing: Dumbarton**

	Dumbarton (High Bridge)	Dumbarton (Low Bridge)	Dumbarton (Tube)	Fremont Central Park (High Bridge)	Fremont Central Park (Low Bridge)	Fremont Central Park (Tube)
<b>Physical/Operational Characteristics</b>						
<b>Alignment Alternative Description<sup>27</sup></b>	This alignment alternative would cross the San Francisco Bay in the Dumbarton Corridor with a high bridge over the existing navigational channel. It would travel generally east to the Shinn/Niles area.	This alignment alternative would cross the San Francisco Bay in the Dumbarton Corridor with draw bridges for the existing navigational channel. It would travel generally east to the Shinn/Niles area.	This alignment alternative would cross the San Francisco Bay in a tube in the Dumbarton Corridor. It would travel generally east to the Shinn/Niles area.	This alignment alternative would cross the San Francisco Bay in the Dumbarton Corridor with a high bridge over the existing navigational channel. It would travel south and east through a power easement and then northeast with a tunnel under Stevenson Boulevard to the Niles area.	This alignment alternative would cross the San Francisco Bay in the Dumbarton Corridor with draw bridges for the existing navigational channel. It would travel south and east through a power easement and then northeast with a tunnel under Stevenson Boulevard to the Niles/Shinn area.	This alignment alternative would cross the San Francisco Bay in a tube in the Dumbarton Corridor. It would travel south and east through a power easement and then northeast with a tunnel under Stevenson Boulevard to the Niles area.
<b>Length</b>	19.06 mi (30.67 km)	20.01 mi (32.21 km)	19.06 mi (30.67 km)	20.11 mi (32.36 km)	21.71 mi (34.94 km)	21.71 mi (34.94 km)
<b>Cost<sup>28</sup> (dollars)</b>	\$1.93 billion	\$1.53 billion	\$2.32 billion	\$2.73 billion	\$2.24 billion	\$3.09 billion
<b>Travel Time</b>	11 min (Niles Jct.- Redwood City)	11 min (Niles Jct.- Redwood City)	11 min (Niles Jct.- Redwood City)	11 min (Niles Jct.- Redwood City)	11 min (Niles Jct.- Redwood City)	11min (Niles Jct.- Redwood City)
<b>Ridership</b>	About the same.	About the same.	About the same.	About the same.	About the same.	About the same.

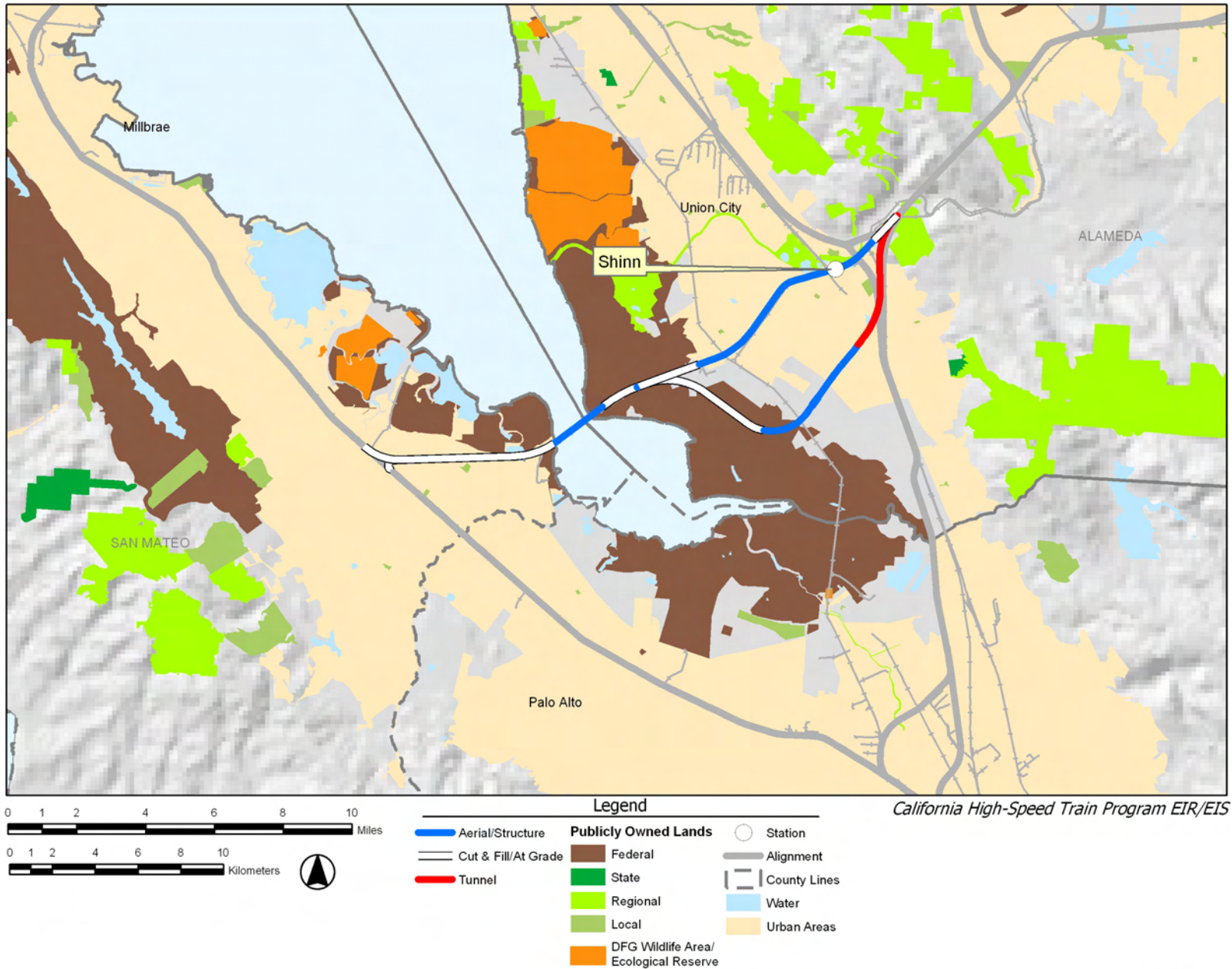
<sup>27</sup> Golden State option ends about 2.5 mi (4.0 km) southeast of Golden State station (at Beale Avenue). Truxton option ends at Truxton station (at Union Avenue).

<sup>28</sup> Segment cost and length begins about 2.5 mi (4.0 km) southeast of Fresno downtown Station (East Jensen Avenue).

**Table 7.3-10  
Trans Bay Crossing: Dumbarton**

	<b>Dumbarton (High Bridge)</b>	<b>Dumbarton (Low Bridge)</b>	<b>Dumbarton (Tube)</b>	<b>Fremont Central Park (High Bridge)</b>	<b>Fremont Central Park (Low Bridge)</b>	<b>Fremont Central Park (Tube)</b>
<b>Constructability</b>	<p>Considerable construction issues associated with urban construction, including aerial structures through Fremont and a new “high” bridge trans bay crossing at Dumbarton.</p> <p>Constructing a new bridge crossing along the Dumbarton corridor would involve major construction activities in sensitive wetlands, saltwater marshes, and aquatic habitat. Special construction methods and mitigations would be required.</p>	<p>Considerable construction issues associated with urban construction, including aerial structures through Fremont and fewer construction issues with a new “low” bridge Trans Bay crossing at Dumbarton.</p> <p>Constructing a new bridge crossing along the Dumbarton corridor would involve major construction activities in sensitive wetlands, saltwater marshes, and aquatic habitat. Special construction methods and mitigations would be required.</p>	<p>Considerable construction issues associated with urban construction, including aerial structures through Fremont and greater construction issues with a new “tube” Trans Bay crossing at Dumbarton.</p> <p>Constructing a new tube crossing along the Dumbarton corridor would involve major construction activities in sensitive wetlands, saltwater marshes, and aquatic habitat. Special construction methods and mitigations would be required.</p>	<p>Considerable construction issues associated with urban construction, including aerial structures through Fremont, tunneling under Fremont Central Park, and a new “high” bridge Trans Bay crossing at Dumbarton.</p> <p>Constructing a new bridge crossing along the Dumbarton corridor would involve major construction activities in sensitive wetlands, saltwater marshes, and aquatic habitat. Special construction methods and mitigations would be required.</p>	<p>Considerable construction issues associated with urban construction, including aerial structures through Fremont, tunneling under Fremont Central Park, and a new “low” bridge Trans Bay crossing at Dumbarton.</p> <p>Constructing a new bridge crossing along the Dumbarton corridor would involve major construction activities in sensitive wetlands, saltwater marshes, and aquatic habitat. Special construction methods and mitigations would be required.</p>	<p>Considerable construction issues associated with urban construction, including aerial structures through Fremont, tunneling under Fremont Central Park, and a new “tube” Trans Bay crossing at Dumbarton.</p> <p>Constructing a new tube crossing along the Dumbarton corridor would involve major construction activities in sensitive wetlands, saltwater marshes, and aquatic habitat. Special construction methods and mitigations would be required.</p>
<b>Operational Issues</b>	<p>Average speed: 98.9 mph (164.9 kph)</p> <p>Maximum speed: 165 mph (275 kph)</p>	<p>Average speed: 98.9 mph (164.9 kph)</p> <p>Maximum speed: 165 mph (275 kph)</p> <p>With the “low-bridge” bay crossing option, HST service would potentially be interrupted, which would adversely</p>	<p>Average speed: 98.9 mph (164.9 kph)</p> <p>Maximum speed: 165 mph (275 kph)</p>	<p>Average speed: 113.2 mph (188.7 kph)</p> <p>Maximum speed: 165 mph (275 kph)</p>	<p>Average speed: 113.2 mph (188.7 kph)</p> <p>Maximum speed: 165 mph (275 kph)</p> <p>With the “low-bridge” bay crossing option, HST service would potentially be interrupted, which</p>	<p>Average speed: 113.2 mph (188.7 kph)</p> <p>Maximum speed: 165 mph (275 kph)</p>





**Figure 7.3-10**  
**HST Alignment Alternatives**  
**Trans Bay Crossing**  
**(Dumbarton)**



**Table 7.3-10**  
**Trans Bay Crossing: Dumbarton**

	<b>Dumbarton (High Bridge)</b>	<b>Dumbarton (Low Bridge)</b>	<b>Dumbarton (Tube)</b>	<b>Fremont Central Park (High Bridge)</b>	<b>Fremont Central Park (Low Bridge)</b>	<b>Fremont Central Park (Tube)</b>
		impact the reliability of the entire system.			would adversely impact the reliability of the entire system.	
<b>Potential Environmental Impacts</b>						
<b>Travel Conditions</b>	About the same as the Fremont Central Park Alternatives.			About the same as the Dumbarton Bridge or tube alternatives.		
<b>Noise and Vibration:</b> <sup>1</sup> High, medium, and low potential impacts	High potential of noise impacts. High potential of vibration impacts. High potential of noise impacts in urban areas where the alignment is predominately on aerial structure (Fremont).	High potential of noise impacts. High potential of vibration impacts. High potential of noise impacts in urban areas where the alignment is predominately on aerial structure (Fremont).	High potential of noise impacts. High potential of vibration impacts. High potential of noise impacts in urban areas where the alignment is predominately on aerial structure (Fremont).	High potential of noise impacts. High potential of vibration impacts. High potential of noise impacts in urban areas where the alignment is predominately on aerial structure (Fremont).	High potential of noise impacts. High potential of vibration impacts. High potential of noise impacts in urban areas where the alignment is predominately on aerial structure (Fremont).	Medium potential of noise impacts. High potential of vibration impacts. High potential of noise impacts in urban areas where the alignment is predominately on aerial structure (Fremont).
<b>Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice</b>	Compatibility: The majority of this alignment alternative is compatible (medium rating) with multi-family, residential, industrial and existing major rail right-of-way. It exhibits a low to medium compatibility where it crosses the San Francisco Bay, in Fremont along the more narrow Centerville line, in the Shinn area.  Environmental Justice: This alignment alternative has medium	Compatibility: The majority of this alignment alternative is compatible (medium rating) with multi-family, residential, industrial and existing major rail right-of-way. It exhibits a low to medium compatibility where it crosses the San Francisco Bay, in Fremont along the more narrow Centerville line, in the Shinn area.  Environmental	Compatibility: The majority of this alignment alternative is compatible (medium rating) with multi-family, residential, industrial and existing major rail right-of-way. It exhibits a low to medium compatibility where it crosses the San Francisco Bay, in Fremont along the more narrow Centerville line, in the Shinn area.  Environmental	Compatibility: The majority of this alignment alternative is compatible (medium rating) with multi-family, residential, industrial and existing major rail right-of-way. It exhibits a low to medium compatibility where it crosses the San Francisco Bay, in Fremont along the more narrow Centerville line, in the Shinn area.  Environmental Justice:	Compatibility: The majority of this alignment alternative is compatible (medium rating) with multi-family, residential, industrial and existing major rail right-of-way. It exhibits a low to medium compatibility where it crosses the San Francisco Bay, in Fremont along the more narrow Centerville line, in the Shinn area.	Compatibility: The majority of this alignment alternative is compatible (medium rating) with multi-family, residential, industrial and existing major rail right-of-way. It exhibits a low to medium compatibility where it crosses the San Francisco Bay, in Fremont along the more narrow Centerville line, in the Shinn area.  Environmental

**Table 7.3-10  
Trans Bay Crossing: Dumbarton**

	<b>Dumbarton (High Bridge)</b>	<b>Dumbarton (Low Bridge)</b>	<b>Dumbarton (Tube)</b>	<b>Fremont Central Park (High Bridge)</b>	<b>Fremont Central Park (Low Bridge)</b>	<b>Fremont Central Park (Tube)</b>
	<p>environmental justice impact rating.</p> <p>Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: This alignment alternative has the potential for medium property impacts.</p>	<p>Justice: This alignment alternative has medium environmental justice impact rating.</p> <p>Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: This alignment alternative has the potential for medium property impacts.</p>	<p>Justice: This alignment alternative has medium environmental justice impact rating.</p> <p>Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: This alignment alternative has the potential for medium property impacts.</p>	<p>This alignment alternative has medium environmental justice impact rating.</p> <p>Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: This alignment alternative has the potential for high property impacts, given that additional right-of-way would be required.</p>	<p>Environmental Justice: This alignment alternative has medium environmental justice impact rating.</p> <p>Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: This alignment alternative has the potential for high property impacts, given that additional right-of-way would be required..</p>	<p>Justice: This alignment alternative has medium environmental justice impact rating.</p> <p>Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: This alignment alternative has the potential for high property impacts, given that additional right-of-way would be required.</p>
<b>Aesthetics and Visual Resources:</b> General impacts and rating.	Medium visual impact from the bridge, on the Don Edwards San Francisco Bay National Wildlife Refuge and on the Centerville alignment across Fremont.	Low visual impact from bridge and medium impacts on Don Edwards San Francisco Bay National Wildlife Refuge and the Centerville alignment	No visual impact from tube and a medium impact on the Don Edwards San Francisco Bay National Wildlife Refuge and the Centerville alignment	Medium visual impact from bridge and on Don Edwards San Francisco Bay National Wildlife Refuge and through Newark.	Low visual impact from bridge and medium visual impacts on Don Edwards San Francisco Bay National Wildlife Refuge and through	No visual impact from tube and medium visual impacts on Don Edwards San Francisco Bay National Wildlife Refuge and through Newark.

**Table 7.3-10**  
**Trans Bay Crossing: Dumbarton**

	<b>Dumbarton (High Bridge)</b>	<b>Dumbarton (Low Bridge)</b>	<b>Dumbarton (Tube)</b>	<b>Fremont Central Park (High Bridge)</b>	<b>Fremont Central Park (Low Bridge)</b>	<b>Fremont Central Park (Tube)</b>
		across Fremont.	across Fremont.		Newark.	
<b>Cultural Resources and Paleontological Resources:</b> <sup>iii</sup> Potential presence of historical resources in area of potential effect	There are 4 known cultural resources.  Archaeological resources include prehistoric sites associated with burials, and historic sites from early 1900s industrial activities.	There are 4 known cultural resources.  Archaeological resources include prehistoric sites associated with burials, and historic sites from early 1900s industrial activities.	There are 4 known cultural resources.  Archaeological resources include prehistoric sites associated with burials, and historic sites from early 1900s industrial activities.	There are no known cultural resources.  No recorded resources were identified in the records search.	There are no known cultural resources.  No recorded resources were identified in the records search.	Known cultural resources: 0  No recorded resources were identified in the records search.
<b>Hydrology and Water Resources:</b> <sup>iv</sup> Potential impacts and associated linear ft (linear m) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	Floodplains: 47.4 ac (19.18 ha) direct/ 162.1 ac (65.60 ha) indirect Streams: 1,028 linear ft (313.3 linear m) direct/ 3,627 linear ft (1,105.5 linear m) indirect  Lakes/Waterbodies: 37.3 ac (15.10 ha) direct/ 143.9 ac (58.24 ha) indirect  Less water resource impacts compared to Fremont Central Park due primarily to the shorter length. Coordination would be required with the USACE under Section 10 of the Rivers and Harbors Act and	Floodplains: 47.4 ac (19.18 ha) direct/ 162.1 ac (65.60 ha) indirect Streams: 1,028 linear ft (313.3 linear m) direct/ 3,627 linear ft (1,105.5 linear m) indirect  Lakes/Waterbodies: 37.3 ac (15.10 ha) direct/ 143.9 ac (58.24 ha) indirect  Less water resource impacts compared to Fremont Central Park due primarily to the shorter length. Coordination would be required with the USACE under Section 10 of the	Floodplains: 47.4 ac (19.18 ha) direct/ 162.1 ac (65.60 ha) indirect Streams: 1,028 linear ft (313.3 linear m) direct/ 3,627 linear ft (1,105.5 linear m) indirect  Lakes/Waterbodies: 37.3 ac (15.10 ha) direct/ 143.9 ac (58.24 ha) indirect  Less water resource impacts compared to Fremont Central Park due primarily to the shorter length. Coordination would be required with the USACE under Section 10 of the	Floodplains: 71.7 ac (29.02 ha) direct/ 258.7 ac (104.70 ha) indirect Streams: 2,041 linear ft (622.1 linear m) direct/ 8,301 linear ft (2,530.1 linear m) indirect  Lakes/Waterbodies: 46.3 ac (18.74 ha) direct/ 179.2 ac (72.52 ha) indirect  Longer length results in additional impacts compared to Dumbarton options. Coordination would be required with the USACE under Section 10 of the Rivers and Harbors	Floodplains: 71.7 ac (29.02 ha) direct/ 258.7 ac (104.70 ha) indirect Stream : 2,041 linear ft (622.1 linear m) direct/ 8,301 linear ft (2,530.1 linear m) indirect  Lakes/Waterbodies: 46.3 ac (18.74 ha) direct/ 179.2 ac (72.52 ha) indirect  Longer length results in additional impacts compared to Dumbarton options. Coordination would be required with the USACE under Section 10 of the	Floodplains: 71.7 ac (29.02 ha) direct/ 258.7 ac (104.70 ha) indirect Streams: 2,041 linear ft (622.1 linear m) direct/ 8,301 linear ft (2,530.1 linear m) indirect  Lakes/Waterbodies: 46.3 ac (18.74 ha) direct/ 179.2 ac (72.52 ha) indirect  Longer length results in additional impacts compared to Dumbarton options. Coordination would be required with the USACE under Section 10 of the



**Table 7.3-10  
Trans Bay Crossing: Dumbarton**

	Dumbarton (High Bridge)	Dumbarton (Low Bridge)	Dumbarton (Tube)	Fremont Central Park (High Bridge)	Fremont Central Park (Low Bridge)	Fremont Central Park (Tube)
	the California Coastal Commission.	Rivers and Harbors Act and the California Coastal Commission.	Rivers and Harbors Act and the California Coastal Commission.	Act and the California Coastal Commission.	Rivers and Harbors Act and the California Coastal Commission.	Rivers and Harbors Act and the California Coastal Commission.
<b>Biological Resources Including Wetlands</b> Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	Wetlands <sup>v</sup> : 33.9 ac (13.7 ha) direct/ 1,641.2 ac (664.2 ha) indirect Bay Waters: 2,361 linear ft (719.6 linear m) Species: 15 special-status plant and 21 special-status wildlife species  Compared to the Fremont Central Park alignment alternative, this alignment alternative would have the least potential direct impact on wetlands, but the most indirect impacts. Potential species impacts include the San Mateo thorn-mint, white-rayed pentachaeta, brown pelican, California clapper rail, California least tern, and the salt marsh harvest mouse. Crossing of the Bay would be subject to USACE, CDFG, and BCDC permit process.			Wetlands <sup>v</sup> : 55.35 ac (22.4 ha) direct/ 1,191 ac (482 ha) indirect Bay Waters: 3,117 linear ft (950.1 linear m) Species: 16 special-status plant and 23 special-status wildlife species  Compared to the Dumbarton alignment alternative options, this alignment alternative would have the most potential direct impact on wetlands, but the least indirect impacts. Potential species impacts include the San Mateo thorn-mint, white-rayed pentachaeta, robust spineflower, vernal pool tadpole shrimp, California tiger salamander, brown pelican, California clapper rail, California least tern, and the salt marsh harvest mouse. Crossing of the Bay would be subject to USACE, CDFG, and BCDC permit process.		
<b>Fault Crossings</b>	Buried Trace of Unnamed Fault (Potentially Active) - At Grade Silver Creek (Potentially Active) - At Grade Hayward (Active) - Above Grade Mission (Potentially Active) - At Grade					
<b>Section 4(f) and 6(f) Resources:</b> <sup>4</sup> Ac (ha) of parkland near HST right-of-way	Public parks, recreation lands, wildlife and waterfowl refuges 0–150 ft (46 m) from center of alignment alternative include (1) Kelly Park, (2) Don Edwards San Francisco Bay National Wildlife Refuge, (3) Newark Civic Center Park, (4) Vallejo Mill Historical Park, and (5) Alameda Creek Trail. Few potential direct impacts are anticipated given that much of the alignment alternative is within or directly adjacent to existing transportation rights-of-way.			Public parks, recreation lands, wildlife and waterfowl refuges 0–150 ft (46 m) from center of alignment alternative include (1) Kelly Park, (2) Don Edwards San Francisco Bay National Wildlife Refuge, (3) Blacow Park, (4) Fremont Central Park, (5) Gomes Park and (6) Vallejo Mill Park. As compared to the “Dumbarton” alternatives, more direct impacts are anticipated given that a considerable amount of this alignment alternative requires a new alignment within the Don Edwards San Francisco Bay National Wildlife Refuge.		

# K. CENTRAL VALLEY ALIGNMENT ALTERNATIVES

All information presented is for potential Central Valley alignment alternatives. This alternative is shown in Figure 7.3-11 and described in Table 7.3-11.

**Table 7.3-11  
Central Valley Alignment Alternatives**

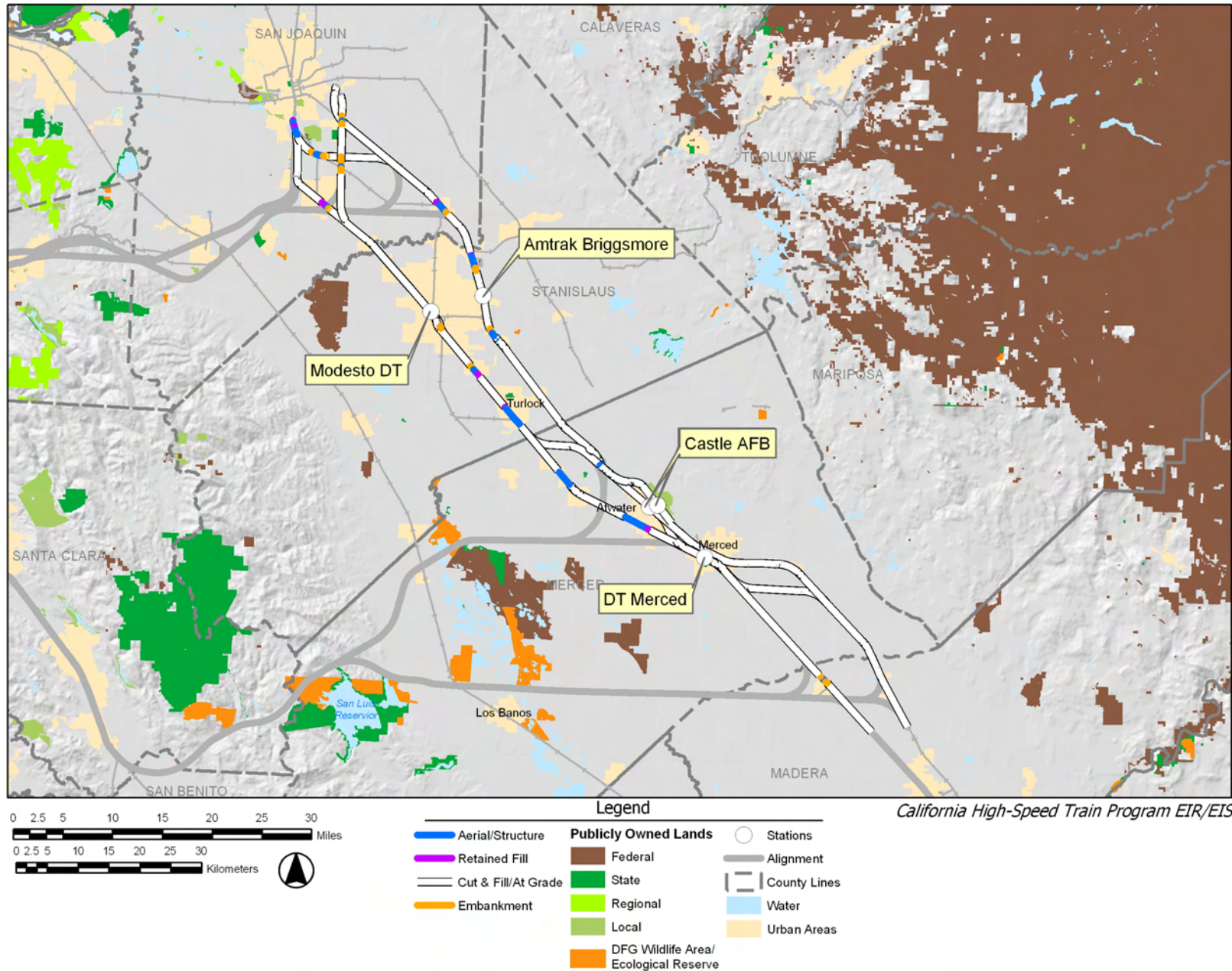
	BNSF – UPRR	BNSF N/S	UPRR N/S	BNSF (Castle AFB)	UPRR- BNSF (Castle AFB)	UPRR – BNSF
<b>Physical/Operational Characteristics</b>						
<b>Alignment Alternative Description<sup>29</sup></b>	This alignment alternative would travel from North Stockton South to the UPRR Connection, along the BNSF line South to Amtrak Briggsmore, then south to the UPRR/BNSF Connection, along the UPRR through Atwater to Downtown Merced, South to BNSF Connection, along the BNSF South to the Henry Miller Wye.  Potential stations are at Modesto (Briggsmore) and Merced (Downtown).	This alignment alternative would connect with either the Altamont or Pacheco Pass alignments. This north-south alignment would link the Bay Area to Central Valley population centers, Sacramento, and southern California. Potential stations are at Modesto (Briggsmore) and Merced (Downtown).	This alignment alternative would connect with either the Altamont or Pacheco Pass alignments. This north-south alignment would link the Bay Area to Central Valley population centers, Sacramento, and southern California. Potential stations are at Modesto (Downtown) and Merced (Downtown).	This alignment alternative would be on BNSF line from Stockton South to Amtrak Briggsmore, would transition to the UPRR/BNSF Connection, then to Castle AFB, travel South to the BNSF connect, follow BNSF South of Castle to the UPRR Connection, and then to the Henry Miller Wye. Potential stations are at Modesto (Briggsmore) and Castle AFB.	This alignment alternative would travel south on the UPRR through Modesto to the BNSF Connection, on the BNSF N/S line to Castle AFB, then south to the connection to the UPRR, then on the Castle Connection to the Henry Miller Wye. Potential station locations are at Modesto (Briggsmore) and Castle AFB.	This alignment alternative would travel south on the UPRR to the through Modesto and Turlock to the UPRR/BNSF Connection to Atwater, from Atwater to Downtown Merced, and then Merced South to BNSF Connection to the Henry Miller Wye. Potential station locations are at Modesto (Downtown) and Merced (Downtown).

<sup>29</sup> Golden State option ends about 2.5 mi (4.0 km) southeast of Golden State station (at Beale Avenue). Truxton option ends at Truxton station (at Union Avenue).

**Table 7.3-11  
Central Valley Alignment Alternatives**

	<b>BNSF – UPRR</b>	<b>BNSF N/S</b>	<b>UPRR N/S</b>	<b>BNSF (Castle AFB)</b>	<b>UPRR- BNSF (Castle AFB)</b>	<b>UPRR – BNSF</b>
<b>Length</b>	92.99 mi (149.65 km)	100.38 mi (161.55 km)	83.85 mi (134.95 km)	92.42 mi (148.74 km)	86.52 mi (139.24 km)	87.09 mi (140.15 km)
<b>Cost<sup>30</sup> (dollars)</b>	\$2.52 billion	\$2.6 billion	\$2.69 billion	\$2.27 billion	\$2.57 billion	\$2.82 billion
<b>Travel Time (minutes)</b>	39 min (Bypass-Fresno)	40 min (Bypass-Fresno)	42 min (Stockton-Fresno)	41 min (Bypass-Fresno)	44 min (Stockton-Fresno)	42 min (Stockton-Fresno)
<b>Constructability</b>	Considerable construction issues associated with urban construction, including extensive aerial structures through Manteca, Modesto, and Merced.	Considerably less urban alignment and associated aerial construction; however, substantially more grade separations are required for at-grade alignments.	Considerable construction issues associated with urban construction, including extensive aerial structures through Manteca, Modesto, and Merced.	Considerably less urban alignment and associated aerial construction; however, substantially more grade separations are required for at-grade alignments and additional length to serve Castle station.	Considerably less urban alignment and associated aerial construction; however, substantially more grade separations are required for at-grade alignments and additional length to serve Castle station.	Considerable construction issues associated with urban construction, including extensive aerial structures through Manteca, Modesto, and Merced.
<b>Ridership</b>	The BNSF-UPRR (used in the Pacheco “Base” Alternative) would have about the same ridership potential (about 0.3% less) as the UPRR for the Pacheco Pass, but is forecast to have slightly less ridership potential (1.5%) for the Altamont Pass.	The BNSF alignment alternative would have slightly less ridership potential than the BNSF-UPRR.	The UPRR alignment alternative would have high ridership and revenue potential for both the Altamont Pass and Pacheco Pass alternatives.	The BNSF Castle alignment alternative would have about the same ridership potential as the BNSF alternative.	The UPRR-Castle alignment alternative would have about the same ridership potential as the UPRR alternatives for the Altamont Pass alternatives and slightly less potential for Pacheco Pass alternatives.	The UPRR-BNSF alignment alternative would have about the same ridership potential as the UPRR for the Altamont Pass alternatives and slightly less potential than the BNSF-UPRR for Pacheco Pass alternatives.

<sup>30</sup> Segment cost and length begins about 2.5 mi (4.0 km) southeast of Fresno downtown Station (East Jensen Avenue).



**Figure 7.3-11**  
**HST Alignment Alternatives**  
**Central Valley Alignment Alternatives**





**Table 7.3-11  
Central Valley Alignment Alternatives**

	<b>BNSF – UPRR</b>	<b>BNSF N/S</b>	<b>UPRR N/S</b>	<b>BNSF (Castle AFB)</b>	<b>UPRR- BNSF (Castle AFB)</b>	<b>UPRR – BNSF</b>
<b>Operational Issues</b>	Average speed: 176.7 mph (294.5 kph)  Maximum speed: 198 mph (330 kph)	Average speed: 176.1 mph (293.5 kph)  Maximum speed: 198 mph (330 kph)	Average speed: 169.7 mph (282.8 kph)  Maximum speed: 198 mph (330 kph)	Average speed: 171.8 mph (286.4 kph)  Maximum speed: 198 mph (330 kph)	Average speed: 166.2 mph (277.1 kph)  Maximum speed: 198 mph (330 kph)	Average speed: 170.5 mph (284.1 kph)  Maximum speed: 198 mph (330 kph)
<b>Potential Environmental Impacts</b>						
<b>Travel Conditions</b>	This alignment alternative would provide direct HST service to Briggsmore and downtown Merced. The alignment alternative would provide a safer, more reliable, energy-efficient intercity mode in the Central Valley while potentially improving the safety, reliability, and performance of the regional commuter service. This alignment alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic flow and reduce air pollution at some existing rail crossings.	This alignment alternative would provide direct HST service to Briggsmore and downtown Merced. The alignment alternative would provide a safer, more reliable, energy-efficient intercity mode in the Central Valley while potentially improving the safety, reliability, and performance of the regional commuter service. This alignment alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic flow and reduce air pollution at some existing rail crossings.	This alignment alternative would provide direct HST service to downtown Modesto and downtown Merced. The alignment alternative would provide a safer, more reliable, energy-efficient intercity mode in the Central Valley while potentially improving the safety, reliability, and performance of the regional commuter service. This alignment alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic flow and reduce air pollution at some existing rail crossings.	This alignment alternative would provide direct HST service to Briggsmore and Castle AFB. The alignment alternative would provide a safer, more reliable, energy-efficient intercity mode in the Central Valley while potentially improving the safety, reliability, and performance of the regional commuter service. The HST alignment alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic flow and reduce air pollution at some existing rail crossings.	This alignment alternative would provide direct HST service to Briggsmore & Castle AFB. The alignment alternative would provide a safer, more reliable, energy-efficient intercity mode in the Central Valley while potentially improving the safety, reliability, and performance of the regional commuter service. This alignment alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic flow and reduce air pollution at some existing rail crossings.	This alignment alternative would provide direct HST service to Downtown Modesto and downtown Merced. The alignment alternative would provide a safer, more reliable, energy-efficient intercity mode in the Central Valley while potentially improving the safety, reliability, and performance of the regional commuter service. This alignment alternative would greatly increase the capacity for intercity and commuter travel and reduce existing automobile traffic flow and reduce air pollution at some existing rail crossings.

**Table 7.3-11  
Central Valley Alignment Alternatives**

	<b>BNSF – UPRR</b>	<b>BNSF N/S</b>	<b>UPRR N/S</b>	<b>BNSF (Castle AFB)</b>	<b>UPRR- BNSF (Castle AFB)</b>	<b>UPRR – BNSF</b>
<b>Noise and Vibration:</b> <sup>1</sup> High, medium, and low potential impacts	<p>Low potential of noise impacts in overall segment.</p> <p>Low potential of vibration impact.</p> <p>Medium potential of noise impacts in urban areas.</p> <p>Low potential of vibration impact in urban areas.</p> <p>Although a majority of the alignment alternative would have low potential impacts, the BNSF-UPRR would have medium potential noise impacts in urban areas where the alignment is predominately on aerial structure. Express services travel at high speeds through these communities (220 mph [354 km]).</p>	<p>Low potential of noise impacts in overall segment.</p> <p>Low potential of vibration impact.</p> <p>Medium potential of noise impacts in urban areas.</p> <p>Low potential of vibration impact in urban areas.</p>	<p>Medium potential of noise impacts in overall segment.</p> <p>Medium potential of noise impacts in urban areas.</p> <p>Low potential of vibration impact in overall segment.</p> <p>Medium potential of vibration impact in urban areas.</p>	<p>Medium potential of noise impacts in overall segment.</p> <p>Medium potential of noise impacts in urban areas.</p> <p>Low potential of vibration impact in overall segment.</p> <p>Medium potential of vibration impact in urban areas.</p>	<p>Medium potential of noise impacts in overall segment.</p> <p>Medium potential of noise impacts in urban areas.</p> <p>Low potential of vibration impact in overall segment.</p> <p>Medium potential of vibration impact in urban areas.</p>	<p>Medium potential impacts in overall segment.</p> <p>Medium potential of noise impacts in urban areas.</p> <p>Low potential of vibration impact in overall segment.</p> <p>Medium potential of vibration impact in urban areas.</p>
<b>Land Use and Planning, Communities and Neighborhoods, Property, and Environmental Justice</b>	Compatibility: The majority of this alignment alternative is compatible (medium rating), given that it is within or immediately	Compatibility: The majority of this alignment alternative is compatible (medium rating), given that it is within or immediately	Compatibility: The majority of this alignment alternative is compatible (medium rating), given that it is within or immediately	Compatibility: The majority of this alignment alternative is compatible (medium rating), given that it is within or immediately adjacent to an existing	Compatibility: The majority of this alignment alternative is compatible (medium rating), given that it is within or immediately	Compatibility: The majority of this alignment alternative is compatible (medium rating), given that it is within or immediately

**Table 7.3-11  
Central Valley Alignment Alternatives**

	<b>BNSF – UPRR</b>	<b>BNSF N/S</b>	<b>UPRR N/S</b>	<b>BNSF (Castle AFB)</b>	<b>UPRR- BNSF (Castle AFB)</b>	<b>UPRR – BNSF</b>
	<p>adjacent to an existing major rail right-of-way.</p> <p>Environmental Justice: This alignment alternative has a medium environmental justice impact rating except for the Briggsmore and Chowchilla areas, where the rating is low.</p> <p>Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: This alignment alternative would have the potential for low to medium property impacts.</p>	<p>adjacent to an existing major rail right-of-way.</p> <p>Environmental Justice: This alignment alternative has a medium environmental justice impact rating except for the Briggsmore and Chowchilla areas, where the rating is low.</p> <p>Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: This alignment alternative would have the potential for low to medium property impacts.</p>	<p>adjacent to an existing major rail right-of-way.</p> <p>Environmental Justice: This alignment alternative has a medium environmental justice impact rating except for the Manteca and Modesto areas, where the rating is low.</p> <p>Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: This alignment alternative would have the potential for low to medium property impacts.</p>	<p>major rail right-of-way.</p> <p>Environmental Justice: This alignment alternative has a medium environmental justice impact rating except for Briggsmore and Chowchilla areas, where the rating is low.</p> <p>Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: This alignment alternative would have the potential for low to medium property impacts.</p>	<p>adjacent to an existing major rail right-of-way.</p> <p>Environmental Justice: This alignment alternative has a medium environmental justice impact rating except for the Manteca and Modesto areas, where the rating is low.</p> <p>Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: This alignment alternative would have the potential for low to medium property impacts.</p>	<p>adjacent to an existing major rail right-of-way.</p> <p>Environmental Justice: This alignment alternative has a medium environmental justice impact rating except for the Manteca, Modesto, Turlock and Chowchilla areas, where the rating is low.</p> <p>Community: This alignment alternative would not affect community cohesion, given that it is within or immediately adjacent to an existing major rail or highway rights-of-way.</p> <p>Property: This alignment alternative would have the potential for low to medium property impacts.</p>

**Table 7.3-11  
Central Valley Alignment Alternatives**

	<b>BNSF – UPRR</b>	<b>BNSF N/S</b>	<b>UPRR N/S</b>	<b>BNSF (Castle AFB)</b>	<b>UPRR- BNSF (Castle AFB)</b>	<b>UPRR – BNSF</b>
<b>Aesthetics and Visual Resources:</b> General impacts and rating.	Includes elevated crossing of SR 4 viaduct in Stockton and SR 99 near French Camp, elevated structure through Escalon and Riverbank, and curve realignments at the Tuolumne and Chowchilla rivers. Overall low visual impact.	Includes new alignment south of Lodi, elevated structure through Escalon and Riverbank, and curve realignments at the Tuolumne and Chowchilla rivers and south of Merced. Overall low visual impact.	Includes elevated crossing of SR 4 viaduct in downtown Stockton, elevated crossing of SR 99 near French Camp, elevated structure through downtown Manteca, curve realignment in Modesto, elevated structures through downtown Turlock and Chowchilla. Overall low visual impact.	Includes new alignment south of Lodi, elevated structures through Escalon and Riverbank, curve realignments at Tuolumne River, south of Merced, and the Chowchilla River, and new alignment into Castle AFB. Overall low visual impact.	Includes elevated crossing of SR 4 viaduct in downtown Stockton, elevated crossing of SR 99 near French Camp, elevated structures through Escalon and Riverbank, curve realignments at Tuolumne and Chowchilla rivers, and a new alignment into Castle AFB. Overall low visual impact.	Includes elevated crossing of SR 4 viaduct in downtown Stockton, elevated Crossing of SR 99 near French Camp, elevated structures through downtown Manteca and Turlock, and curve realignments in Modesto and at the Chowchilla River. Overall low visual impact.
<b>Farmlands:</b> <sup>ii</sup> Ac (ha) potentially affected	Farmland: 776 ac (314.0 ha)  BNSF-UPRR alignment alternative would have less potential impacts on farmlands than the BNSF alignment alternative. Impact up to 326 ac (132 ha) of prime farmland.	Farmland: 838 ac (339.1 ha)  BNSF alignment alternative would potentially impact the most farmland, including the most prime farmland. Impact up to 407 ac (164.8 ha) of prime farmland.	Farmland: 535 ac (216.4 ha)  UPRR alignment alternative would have the least potential impacts on farmlands and prime farmland. Impact up to 269 ac (108.8 ha) of prime farmland.	Farmland: 817 ac (330.8 ha)  BNSF (Castle AFB) alignment alternative would potentially impact the second highest amount of farmland and prime farmland. Impact up to 386 ac (156.1 ha) of prime farmland.	Farmland: 622 ac (251.8 ha)  UPRR-BNSF (Castle AFB) alignment alternative would potentially impact more farmlands than the UPRR-BNSF. Transition to BNSF may have potential severance impacts. Impact up to 331 ac (134.1 ha) of prime farmland.	Farmland: 610 ac (247.0 ha)  UPRR-BNSF alignment alternative would potentially impact more farmland than UPRR. Transition to BNSF may have potential severance impacts. Impact up to 318 ac (128.8 ha) of prime farmland.
<b>Cultural Resources and Paleontological Resources:</b> <sup>iii</sup>	There are 28 known cultural resources. Generally follows existing railroad	There are 17 known cultural resources. Generally follows existing railroad lines.	There are 67 known cultural resources. Generally follows existing railroad	There are 21 known cultural resources. Generally follows existing railroad lines.	There are 24 known cultural resources. Generally follows existing railroad lines.	There are 31 known cultural resources. Generally follows existing railroad lines.

**Table 7.3-11  
Central Valley Alignment Alternatives**

	<b>BNSF – UPRR</b>	<b>BNSF N/S</b>	<b>UPRR N/S</b>	<b>BNSF (Castle AFB)</b>	<b>UPRR- BNSF (Castle AFB)</b>	<b>UPRR – BNSF</b>
Potential presence of historical resources in area of potential effect	lines. The majority of architectural resources identified were related to the railroad and residential properties dating from the 1920s.	The majority of resources identified are located around Escalon and include portions of the ATSF railroad and residential properties dating from 1910.	lines. The majority of resources identified are located around the communities of Delhi, Livingston, Atwater, and Chowchilla. Archaeological resources include both prehistoric and historic sites.	Architectural resources identified were related to the railroad and residential properties dating from the 1900s. Most of the resources are within the cities of Escalon and Chowchilla.	Architectural resources identified were related to the railroad, commerce and industry, and residential properties dating from the 1900s. Most of the resources are within the cities of Modesto and Merced and include portions of the ATSF railroad.	Architectural resources identified were related to highway bridges and residential properties dating from the 1900s. Most of the architectural resources are around Chowchilla.
<b>Hydrology and Water Resources:</b> <sup>iv</sup> Potential impacts and associated linear ft (linear m) of floodplains and linear ft (m) of streams within potential impact study areas, ac (ha) lakes/other water bodies within study areas.	Floodplains: 183.5 ac (74.26 ha) direct/ 669.5 ac (270.95 ha) indirect  Streams: 8,291 linear ft (2,527.1 linear m) direct/ 31,632 linear ft (9,641.4 linear m) indirect  Lakes/Waterbodies: 1.5 ac (0.61 ha) direct/ 6.3 ac (2.55 ha) indirect  Potentially affect at least 33 unnamed and named water resources, including Stanislaus River; Hetch Hetchy Aqueduct; Tuolumne River; Merced River; Ash Slough and	Floodplains: 191.1 ac (77.34 ha) direct/ 759.2 ac (307.25 ha) indirect  Streams: 8,398 linear ft (2,559.7 linear m) direct/ 32,594 linear ft (9,934.7 linear m) indirect  Lakes/Waterbodies: 1.6 ac (0.65 ha) direct/ 6.7 ac (2.71 ha) indirect  Potentially affect at least 45 number of unnamed and named water resources, including Stanislaus River; Hetch Hetchy Aqueduct; Tuolumne River; Merced River; and Chowchilla River.	Floodplains: 123.4 ac (49.94 ha) direct/ 422.7 ac (171.07 ha) indirect  Streams: 7,547 linear ft (2300.3 linear m) direct/ 41,122 linear ft (12,534.0 linear m) indirect  Lakes/Waterbodies: 0 ac (0.0 ha) direct/ 0.0 ac (0.0 ha) indirect  Potentially affect at least 35 unnamed water resources, including Stanislaus River; Hetch Hetchy Aqueduct; Tuolumne River; Merced River; Chowchilla River; Ash Slough and Bypass; and Berenda	Floodplains: 158.2 ac (64.02 ha) direct/ 628.8 ac (254.48 ha) indirect  Streams: 6,965 linear ft (2,122.9 linear m) direct/ 30,37 linear ft (9,257.1 linear m) indirect  Lakes/Waterbodies: 1.6 ac (0.65 ha) direct/ 6.7 ac (2.71 ha) indirect  Potentially affect at least 43 unnamed and named water resources, including Stanislaus River; Hetch Hetchy Aqueduct; Tuolumne River; Merced River; Chowchilla River; Ash Slough and Bypass	Floodplains: 97.7lac (39.54 ha) direct/ 388 ac (157.02 ha) indirect  Stream : 7,734 linear ft (2,357.3 linear m) direct/ 43,276 linear ft (13,190.5 linear m) indirect  Lakes/Waterbodies: 0.1 ac (0.04ha) direct/ 0.4 ac (0.16 ha) indirect  Potentially affect at least 34 unnamed and named water resources, including Stanislaus River; Hetch Hetchy Aqueduct; Tuolumne River; Chowchilla River; Ash Slough	Floodplains: 123.1 ac (49.82 ha) direct/ 428.7 ac (173.49 ha) indirect  Streams: 9,060 linear ft (2,761.5 linear m) direct/ 44,538 linear ft (13,575.2 linear m) indirect  Lakes/Waterbodies: 0.0 ac (0.0 ha) direct/ 0.0 ac (0.0ha) indirect  Potentially affect at least 42 unnamed and named water resources, including Stanislaus River; Hetch Hetchy Aqueduct; Tuolumne River; Merced River; Ash Slough and Bypass; and Berenda



**Table 7.3-11  
Central Valley Alignment Alternatives**

	<b>BNSF – UPRR</b>	<b>BNSF N/S</b>	<b>UPRR N/S</b>	<b>BNSF (Castle AFB)</b>	<b>UPRR- BNSF (Castle AFB)</b>	<b>UPRR – BNSF</b>
	Bypass; and the Berenda Slough. Where constructed either at-grade or on cut and fill, culverts would be sized appropriately to convey anticipated storm flows and to minimize ponding.	Where constructed either at-grade or on cut and fill, culverts would be sized appropriately to convey anticipated storm flows and to minimize ponding.	Slough. Where constructed either at-grade or on cut and fill, culverts would be sized appropriately to convey anticipated storm flows and to minimize ponding.	Berenda Slough; and Berenda Creek. Where constructed either at-grade or on cut and fill, culverts would be sized appropriately to convey anticipated storm flows and to minimize ponding.	and Bypass; Berenda Slough; and Berenda Creek. Where constructed either at-grade or on cut and fill, culverts would be sized appropriately to convey anticipated storm flows and to minimize ponding.	Slough. Where constructed either at-grade or on cut and fill, culverts would be sized appropriately to convey anticipated storm flows and to minimize ponding.
<b>Biological Resources Including Wetlands</b> Ac (ha) of wetland, linear ft (m) of non-wetland waters, and number of special-status species within potential impact study areas	Wetlands <sup>v</sup> : 3.76 ac (1.52 ha) direct/ 219.7 ac (88.9 ha) indirect Non-Wetland Waters: 10,137 linear ft (3,089.8 linear m) Species: 22 special-status plant and 22 special-status wildlife species This alignment alternative would have potential to directly impact the most wetlands. Potential species impacts include valley elderberry longhorn beetle, vernal pool fairy and tadpole shrimp, and San Joaquin kit fox. Potentially result in a barrier to wildlife	Wetlands <sup>v</sup> : 3.41 ac (1.38 ha) direct/ 261.1 ac (105.7ha) indirect Non-Wetland Waters: 10,528 linear ft (3,208.9 linear m) Species: 22 special-status plant and 22 special-status wildlife species This alignment alternative would have potential to indirectly impact the most wetlands and directly impact the most waters. Potential species impacts include valley elderberry longhorn beetle, vernal pool fairy and tadpole shrimp, and San Joaquin kit fox. Potentially result in a	Wetlands <sup>v</sup> : 3.04 ac (1.23 ha) direct/ 136.5 ac (55.2 ha) indirect Non-Wetland Waters: 7,161 linear ft (2,182.7 linear m) Species: 22 special-status plant and 21 special-status wildlife species This alignment alternative would have potential to directly impact the least waters. Potential species impacts include valley elderberry longhorn beetle and vernal pool fairy and tadpole shrimp. Placement along transportation corridors and the use of aerial structures	Wetlands <sup>v</sup> : 3.11 ac (1.26 ha) direct/ 234.8 ac (95 ha) indirect Non-Wetland Waters: 9,094 linear ft (2,771.1 linear m) Species: 19 special-status plant and 22 special-status wildlife species This alignment alternative would have potential to impact fewer plant species. Potential species impacts include valley elderberry longhorn beetle, vernal pool fairy and tadpole shrimp, and San Joaquin kit fox. Potentially result in a barrier to wildlife movement. Placement along transportation	Wetlands <sup>v</sup> : 2.39 ac (0.97 ha) direct/ 172.7 ac (69.9 ha) indirect Non-Wetland Waters: 7,790 linear ft (2,374.4 linear m) Species: 22 special-status plant and 22 special-status wildlife species This alignment alternative would have potential to directly impact the least wetlands. Potential species impacts include valley elderberry longhorn beetle, vernal pool fairy and tadpole shrimp, and San Joaquin kit fox. Potentially result in a barrier to wildlife movement.	Wetlands <sup>v</sup> : 3.04 ac (1.23 ha) direct/ 157.6 ac (63.8 ha) indirect Non-Wetland Waters: 8,833 linear ft (2,692.3 linear m) Species: 25 special-status plant and 22 special-status wildlife species This alignment alternative would have potential to indirectly impact the least wetlands. Potential species impacts include valley elderberry longhorn beetle, vernal pool fairy and tadpole shrimp, and San Joaquin kit fox. Potentially result in a barrier to wildlife movement.

**Table 7.3-11  
Central Valley Alignment Alternatives**

	<b>BNSF – UPRR</b>	<b>BNSF N/S</b>	<b>UPRR N/S</b>	<b>BNSF (Castle AFB)</b>	<b>UPRR- BNSF (Castle AFB)</b>	<b>UPRR – BNSF</b>
	movement. Placement along transportation corridors and the use of aerial structures would minimize impacts.	barrier to wildlife movement. Placement along transportation corridors and the use of aerial structures would minimize impacts.	would minimize impacts.	corridors and the use of aerial structures would minimize impacts.	Placement along transportation corridors and the use of aerial structures would minimize impacts.	Placement along transportation corridors and the use of aerial structures would minimize impacts.
<b>Fault Crossings</b>	None					
<b>Section 4(f) and 6(f) Resources:</b> <sup>4</sup> Ac (ha) of parkland near HST right-of-way	Public parks, recreation lands, wildlife and waterfowl refuges within 0–150 ft (46 m) from center of the alignment alternative include (1) County Park, (2) Tuolumne River Regional Park, (3) Stanislaus County Fairgrounds, (4) Broadway Park, and (5) Central Park. Few potential direct impacts are anticipated given that much of the alignment alternative is within or directly adjacent to existing transportation rights-of-way.	Public parks, recreation lands, wildlife and waterfowl refuges within 0–150 ft (46 m) from center of the alignment alternative include (1) Main Street Park, (2) Jacob Meyer Regional Park, and (3) Zerillo Park. Few potential direct impacts are anticipated given that much of the alignment alternative is within or directly adjacent to existing transportation rights-of-way.	Public parks, recreation lands, wildlife and waterfowl refuges within 0–150 ft (46 m) from center of the alignment alternative include (1) County Park, (2) Tuolumne River Regional Park, (3) Stanislaus County Fairgrounds, (4) Broadway Park, and (5) Central Park. Few potential direct impacts are anticipated given that much of the alignment alternative is within or directly adjacent to existing transportation rights-of-way.	Public parks, recreation lands, wildlife and waterfowl refuges within 0–150 ft (46 m) from center of the alignment alternative include (1) Main Street Park, (2) Jacob Meyer Regional Park, and (3) Zerillo Park. Few potential direct impacts are anticipated given that much of the alignment alternative is within or directly adjacent to existing transportation rights-of-way.	Public parks, recreation lands, wildlife and waterfowl refuges within 0–150 ft (46 m) from center of the alignment alternative include (1) County Park, (2) Tuolumne River Regional Park, (3) Stanislaus County Fairgrounds, (4) Broadway Park, and (5) Central Park. Few potential direct impacts are anticipated given that much of the alignment alternative is within or directly adjacent to existing transportation rights-of-way.	Public parks, recreation lands, wildlife and waterfowl refuges within 0–150 ft (46 m) from center of the alignment alternative include (1) County Park, (2) Tuolumne River Regional Park, (3) Stanislaus County Fairgrounds, (4) Broadway Park, and (5) Central Park. Few potential direct impacts are anticipated given that much of the alignment alternative is within or directly adjacent to existing transportation rights-of-way.

### 7.3.1 Bay Area to Central Valley Station Options

Station Name (Alignment)	Discussion
<b>Downtown San Francisco</b>	
<b>Transbay Transit Center – Caltrain Alignment</b>	<p>The Transbay Transit Center would offer greater connectivity to San Francisco and the greater Bay Area than the existing 4<sup>th</sup> and King site because of its location in the heart of the downtown San Francisco financial district, where many potential HST passengers could walk to the station. In addition, the Transbay Transit Center would emerge as the transit hub for all major services to downtown San Francisco, with the advantage of direct connections to BART, Muni (the terminal is one block from BART/Muni), and regional bus transit (Muni, Samtrans, AC Transit, and Golden Gate Bridge District). Since the Transbay Transit Center would offer greater connectivity to San Francisco and the greater Bay Area than the existing 4<sup>th</sup> and King site, total travel times to the Transbay Transit Center are expected to be superior. The Transbay Transit Center is very compatible with existing and planned development and is the focal point of the Transbay Redevelopment Plan that includes extensive high density residential, office, and commercial/retail development.</p> <p>The Transbay Transit Center would have high ridership potential. Intercity ridership forecasts estimate between 9.0 and 12.7 million total boardings and alightings annually by 2030 for the Pacheco “Base” network alternative and 6.7 to 9.4 million for the Altamont “Base” network alternative. However, the rail portion of the connection between 4<sup>th</sup> and King and the Transbay Transit Center (that would be used by Caltrain and HST) requires difficult tunneling throughout the alignment and is estimated to cost nearly \$786 million for the 1.3-mi (2.1-km) extension (including underground HST/Caltrain station, tail tracks, and reconfiguring of the 4<sup>th</sup> and King yard). Both station options would have low potential environmental impacts.</p> <p>Assuming dedicated use of four tracks and two island platforms by HST, the planned configuration of the Transbay Transit Center could serve all of the trains proposed in the operational plan, the Transbay Transit Center JPB is currently exploring a “loop” concept which could significantly increase capacity at this potential terminus site. However, given the rail facilities planned for the Transbay Transit Center (6 tracks and 3 platforms), the overall capacity available to accommodate HST and Caltrain commuter service would need subsequent cooperative operations planning analysis to determine the most efficient mix and scheduling of services to be accommodated. Any HST services that are determined not to be accommodated at the Transbay Transit Center facility could terminate at other stations along the peninsula or East Bay.</p> <p><b>Environmental Issues</b></p> <p><b>Traffic:</b> 2030 No HST: V/C =0.90; LOS =D  2030 HST (Pacheco): V/C =1.08; LOS =F  2030 HST (Altamont): V/C =1.03; LOS =F</p> <p><b>Parking Space Demand:</b> (Pacheco): 2,000 - 3,000; (Altamont): 1,500 - 2,100</p> <p><b>Land Use/Environmental Justice:</b> Highly compatible with existing transportation and high-density office uses. Potential for impacts is low as percentages of environmental justice populations are lower than the thresholds.</p> <p><b>Farmlands:</b> No farmland resources were identified at this station location.</p> <p><b>Cultural Resources and Paleontological Resources:</b> The Transbay Terminal and Transbay Terminal Loop Ramp were identified within the area of potential effects for this station site, and this location is in an area of high sensitivity</p>

Station Name (Alignment)	Discussion
	<p>for historic resources. The Transbay Terminal was built in 1939 and will be replaced with a new structure as part of the new Transbay Transit Center sometime between 2008 and 2014.</p> <p><b>Hydrology and Water Resources:</b> This station site has the potential to impact 9.1 ac (3.68 ha) of groundwater.</p> <p><b>Biological Resources Including Wetlands:</b> One special-status plant species, the beach layia, was identified for this site.</p> <p><b>Faults:</b> None</p> <p><b>Section 4(f) and 6(f) Resources:</b> No 4(f) or 6(f) resources within 900 ft (274 m) of the station.</p>
<p><b>4<sup>th</sup> and King (Caltrain)</b> – Caltrain Alignment</p>	<p>The 4<sup>th</sup> and King station is the existing terminus for the Caltrain commuter rail service. This station site (adjacent to SBC Park) is well connected to the San Francisco Muni system, but stops more than 1 mi (1.6 km) short of the financial district and does not connect to BART or regional bus transit. The station would have about a 2.5-min shorter train travel time to San Francisco than the Transbay Transit Center.</p> <p>The 4<sup>th</sup> and King station would also have high ridership potential. Sensitivity analysis on the Pacheco Pass “Base” forecasts (low-end forecasts) concluded that the 4<sup>th</sup> and King terminal station would attract about 1 million fewer annual passengers (about 3.0%) than the Transbay Transit Center (including long-distance commuter passengers) and would have \$19 million less revenue (0.6% less). The underground 4<sup>th</sup> and King terminal station is estimated to cost \$792 million.</p> <p><b>Environmental Issues</b></p> <p><b>Traffic:</b> 2030 No HST: V/C =0.40; LOS =A  2030 HST (Pacheco): V/C =0.69; LOS =B  2030 HST (Altamont): V/C =0.61; LOS =B</p> <p><b>Parking Space Demand: (Pacheco):</b> 2,000 - 3,000; <b>(Altamont):</b> 1,500 - 2,100</p> <p><b>Land Use/Environmental Justice:</b> Highly compatible with existing Caltrain station and surrounding uses. Potential for impacts is low as percentages of environmental justice populations are lower than the thresholds.</p> <p><b>Farmlands:</b> No farmland resources were identified at this station location.</p> <p><b>Cultural Resources and Paleontological Resources:</b> No known cultural resources were identified within the area of potential effects for this station site; however, this location is in an area of high sensitivity for historic resources.</p> <p><b>Hydrology and Water Resources:</b> This station site has the potential to impact 40.6 ac (16.43 ha) of groundwater.</p> <p><b>Biological Resources Including Wetlands:</b> One special-status plant species, the beach layia, was identified for this site.</p> <p><b>Faults:</b> None</p> <p><b>Section 4(f) and 6(f) Resources:</b> No 4(f) or 6(f) resources within 900 ft (274 m) of the station.</p>

Station Name (Alignment)	Discussion
<b>Mid-Peninsula</b>	
<b>Redwood City (Caltrain) – Caltrain Alignment</b>	<p>This station would be multi-modal station at the existing Caltrain Redwood City station location. Ridership forecasts estimate 1.7 – 2.4 million total boardings and alightings annually by 2030 for the Pacheco Pass “Base” network alternative and 1.15 million for the Altamont Pass “Base” network alternative.</p> <p>The Redwood City station option would have moderate construction and right-of-way issues and low potential environmental impacts, and is expected to cost about \$67.5 million<sup>31</sup>.</p> <p><b>Environmental Issues</b></p> <p><b>Traffic:</b> <b>2030 No HST:</b> V/C =0.68; LOS =B  <b>2030 HST (Pacheco):</b> V/C =0.72; LOS =C  <b>2030 HST (Altamont):</b> V/C =0.71; LOS =C</p> <p><b>Parking Space Demand: (Pacheco):</b> 3,000 - 3,900; <b>(Altamont):</b> 2,300 - 3,000</p> <p><b>Land Use/Environmental Justice:</b> Compatible with existing Caltrain station and adjacent downtown commercial/service oriented uses. Consistent with plans that promote transit alternatives to the automobile. Potential for impacts is low as percentages of environmental justice populations are lower than the thresholds.</p> <p><b>Farmlands:</b> No farmland resources were identified at this station location.</p> <p><b>Cultural Resources and Paleontological Resources:</b> No known cultural resources were identified within the area of potential effects for this station site. This station site was identified as having a low sensitivity for cultural resources.</p> <p><b>Hydrology and Water Resources:</b> This station site has the potential to impact 6.2 ac (2.51 ha) of groundwater.</p> <p><b>Biological Resources Including Wetlands:</b> No special-status plant or wildlife species were identified for this site.</p> <p><b>Faults:</b> None</p> <p><b>Section 4(f) and 6(f) Resources:</b> No 4(f) or 6(f) resources within 900 ft (274 m) of the station.</p>
<b>Palo Alto (Caltrain) – Caltrain Alignment</b>	<p>This station would be a multi-modal station at the existing Caltrain Palo Alto station location. The Palo Alto station would be a stop for the Caltrain express services, and therefore would have better connectivity to the regional commuter service and to the Peninsula.</p> <p>The Palo Alto station would be expected to have similar costs (\$67.5 million<sup>32</sup>), construction issues, right-of-way issues, and forecast to have about 8% higher ridership potential (1.8 – 2.6 million boardings and alightings by 2030 for the Pacheco Pass “Base” network alternative) than the Redwood City station.</p>

<sup>31</sup> Shared-use station includes modification to existing platforms and passenger facilities only within existing right-of-way. Does not include full express and stopping track configuration assumed for HST stations on dedicated high-speed lines.

<sup>32</sup> Shared-use station includes modification to existing platforms and passenger facilities only within existing right-of-way. Does not include full express and stopping track configuration assumed for HST stations on dedicated high-speed lines.



Station Name (Alignment)	Discussion
	<p><b>Environmental Issues</b></p> <p><b>Traffic:</b> 2030 No HST: V/C =0.47; LOS =A  2030 HST (Pacheco): V/C =0.50; LOS =A  2030 HST (Altamont): V/C =0.49; LOS =A</p> <p><b>Parking Space Demand:</b> (Pacheco): 3,000 - 3,900; (Altamont): 2,300 - 3,000</p> <p><b>Land Use/Environmental Justice:</b> Compatible with Caltrain station, multi-family housing, and facilities associated with Stanford University. Consistent with multi-modal transit center. Potential for impacts is low as percentages of environmental justice populations are lower than the thresholds.</p> <p><b>Farmlands:</b> No farmland resources were identified at this station location.</p> <p><b>Cultural Resources and Paleontological Resources:</b> The existing station was built in 1941 and added to the National Register of Historic Places in 1996. This station site was identified as having a moderate sensitivity for cultural resources.</p> <p><b>Hydrology and Water Resources:</b> This station site has the potential to impact 20.7 ac (8.38 ha) of groundwater.</p> <p><b>Biological Resources Including Wetlands:</b> One special-status wildlife species, California tiger salamander, was identified for this site.</p> <p><b>Faults:</b> None</p> <p><b>Section 4(f) and 6(f) Resources:</b> No 4(f) or 6(f) resources within 900 ft (274 m) of the station.</p>
<b>San Jose</b>	
<p><b>San Jose (Diridon) -</b> Caltrain and Niles/I-880 Alignment Alternatives</p>	<p>Diridon station would be a multi-modal hub maximizing connectivity to downtown San Jose and the southern Bay Area. Diridon station would have high connectivity and accessibility and would serve Caltrain, ACE Commuter Rail, Capitol Corridor, Amtrak, VTA buses, and light rail, with a possible link to BART. This station would also have high ridership potential. Ridership forecasts project between 4.0 – 5.8 million total boardings and alightings annually by 2030 for the Pacheco Pass “Base” network alternative, and 2.65 million for the Altamont Pass “Base” network alternative.</p> <p>The HST platforms and tracks would be on an aerial structure constructed over the existing Diridon station platforms. As a result, there would be high construction issues but low potential environmental impacts, and a medium level of compatibility with existing land uses. This station is estimated to cost \$185 million.</p> <p><b>Environmental Issues</b></p> <p><b>Traffic:</b> 2030 No HST: V/C =0.48; LOS =A  2030 HST (Pacheco): V/C =0.59; LOS =A  2030 HST (Altamont): V/C =0.58; LOS =A</p> <p><b>Parking Space Demand:</b> (Pacheco): 7,200 – 9,800; (Altamont): 6,500 - 8,800</p> <p><b>Land Use/Environmental Justice:</b> Compatible with San Jose Diridon Caltrain station and industrial uses. Consistent with plans for downtown redevelopment. Potential for impacts is low as percentages of environmental justice populations are lower than the thresholds.</p>

Station Name (Alignment)	Discussion
	<p><b>Farmlands:</b> No farmland resources were identified at this station location.</p> <p><b>Cultural Resources and Paleontological Resources:</b> Cultural resources, including the Diridon (Cahill) Station and surrounding area, were identified within the area of potential effects. This station site was identified as having a moderate sensitivity for cultural resources.</p> <p><b>Hydrology and Water Resources:</b> This station site has the potential to impact 18.8 ac (7.61 ha) of groundwater.</p> <p><b>Biological Resources Including Wetlands:</b> One special-status plant species, the robust spineflower, and one special-status wildlife species, the California tiger salamander, were identified for this site.</p> <p><b>Faults:</b> None</p> <p><b>Section 4(f) and 6(f) Resources:</b> No 4(f) or 6(f) resources within 900 ft (274 m) of the station.</p>
<b>Airports</b>	
<p><b>Millbrae/SFO</b> – Caltrain Alignment Alternative</p> <p><b>Coliseum/Airport</b> - Niles/I-880 Alignment Alternative</p>	<p>Both potential airport stations would have direct connections to local and regional commuter rail services and would reduce potential travel times and costs for HST passengers who would use the trains for access to the airports. None of the two airport stations would be in the airport terminals, but each would permit easy access by potential people movers or shuttles (at SFO, BART currently provides a direct connection from the Millbrae Caltrain station to the SFO international terminal). Both potential airport stations would be on the alignments being investigated for service to San Francisco and Oakland. The shared-use station at SFO is estimated to cost \$29.1 million.<sup>33</sup> The OAK/Coliseum station is estimated to cost \$61.7 million.</p> <p>SFO is the northern California hub airport for national and international flights. For the Millbrae/SFO station forecasts project between 1.176 million total boardings and alightings annually by 2030 for the Pacheco Pass “Base” network alternative and 0.93 million for the Altamont Pass “Base” network alternative. This station would have high connectivity linking the HST service to BART, Caltrain, and bus services as well as to SFO.</p> <p>The Coliseum/Airport station would have high connectivity, linking to BART, Capitol Corridor, and AC Transit buses, as well as Oakland International Airport (OAK).</p> <p><b>Environmental Issues (Millbrae/SFO)</b></p> <p><b>Traffic:</b> 2030 No HST: V/C =0.91; LOS =E  2030 HST (Pacheco): V/C =0.96; LOS =E  2030 HST (Altamont): V/C =0.96; LOS =E</p> <p><b>Parking Space Demand: (Pacheco):</b> 2,400 - 2,500; <b>(Altamont):</b> 2,100 - 2,500</p> <p><b>Land Use/Environmental Justice:</b> Compatible with existing transportation uses at the Millbrae BART/Caltrain Station area. Station constructed at existing Millbrae BART/Caltrain Station. Potential for impacts is low as percentages of environmental justice populations are lower than the thresholds.</p>

<sup>33</sup> Shared-use station includes modification to existing platforms and passenger facilities only within existing right-of-way. Does not include full express and stopping track configuration assumed for HST stations on dedicated HST lines.

Station Name (Alignment)	Discussion
	<p><b>Farmlands:</b> No farmland resources were identified at this station location.</p> <p><b>Cultural Resources and Paleontological Resources:</b> Original station located nearby in Millbrae was built in 1907 and is now a museum. This station site was identified as having a high sensitivity for cultural resources.</p> <p><b>Hydrology and Water Resources:</b> This station site has the potential to impact 11 ac (4.45 ha) of groundwater.</p> <p><b>Biological Resources Including Wetlands:</b> No special-status plant or wildlife species were identified for this site.</p> <p><b>Section 4(f) and 6(f) Resources:</b> No 4(f) or 6(f) resources within 900 ft (274 m) of the station.</p> <p><b>Environmental Issues (Coliseum/Airport)</b></p> <p><b>Traffic:</b> 2030 No HST: V/C =0.45; LOS =A  2030 HST (Pacheco): V/C =0.52; LOS =A  2030 HST (Altamont): V/C =0.52; LOS =A</p> <p><b>Parking Space Demand: (Pacheco): N/A; (Altamont): N/A</b></p> <p><b>Land Use/Environmental Justice:</b> Compatible with industrial uses and commercial uses associated with the McAfee Coliseum and ORACLE Arena. Consistent with plans for transit oriented district. Station constructed at existing Coliseum/Oakland BART Station. Potential for impacts is medium as percentages of environmental justice populations within station area exceed threshold.</p> <p><b>Farmlands:</b> No farmland resources were identified at this station location.</p> <p><b>Cultural Resources and Paleontological Resources:</b> No known cultural resources were identified within the area of potential effects for this station site. This station site was identified as having a low sensitivity for cultural resources.</p> <p><b>Hydrology and Water Resources:</b> This station site has the potential to impact 1.6 ac (0.65 ha) of floodplain, 1,683 linear ft (513 linear m) of streams, and 15.1 ac (6.11 ha) of groundwater.</p> <p><b>Biological Resources Including Wetlands:</b> No special-status plant or wildlife species were identified for this site. This station site has the potential to impact 0.64 ac (0.26 ha) of wetlands.</p> <p><b>Faults:</b> None</p> <p><b>Section 4(f) and 6(f) Resources:</b> One resource, Coliseum Gardens Park, within 450 ft (137 m) of station.</p>
<b>Oakland</b>	
<p><b>West Oakland/7<sup>th</sup> Street - Niles/I-880 Alignment Alternative</b></p>	<p>This station would directly connect with BART and would have good freeway access.</p> <p>Both the West Oakland and 12<sup>th</sup> Street station options would be underground and require alignments with deep-bore tunneling, with associated high construction issues and costs. The West Oakland station is estimated to cost \$611 million. The 4.18-mi (6.72-km) alignment between a common point at 29<sup>th</sup> Street north of the Oakland Coliseum and West Oakland is estimated to cost \$518 million (not including station, parking, or any associated right-of-way). The West Oakland station site would be adjacent to BART in a mixed-use area. Like the Transbay Transit Center (in San Francisco), this site is forecast to have high ridership potential. It has a medium ranking for potential land-use compatibility conflicts and presence of minority populations in the vicinity of the station area.</p> <p><b>Environmental Issues</b></p>

Station Name (Alignment)	Discussion
	<p><b>Traffic:</b> 2030 No HST: V/C =0.16; LOS =A  2030 HST (Pacheco): V/C =0.32; LOS =A  2030 HST (Altamont): V/C =0.32; LOS =A</p> <p><b>Parking Space Demand:</b> (Pacheco): N/A; (Altamont): N/A</p> <p><b>Land Use/Environmental Justice:</b> Compatible with existing West Oakland BART Station and transit-oriented district. Consistent with plans for transit oriented district. Station constructed below grade. Potential for impacts is medium as percentages of environmental justice populations within station area exceed threshold.</p> <p><b>Farmlands:</b> No farmland resources were identified at this station location.</p> <p><b>Cultural Resources and Paleontological Resources:</b> No known cultural resources were identified within the area of potential effects for this station site. This station site was identified as having a low sensitivity for cultural resources.</p> <p><b>Hydrology and Water Resources:</b> This station site has the potential to impact 5.1 ac (2.06 ha) of groundwater.</p> <p><b>Biological Resources Including Wetlands:</b> No special-status plant or wildlife species were identified for this site.</p> <p><b>Faults:</b> None</p> <p><b>Section 4(f) and 6(f) Resources:</b> No 4(f) or 6(f) resources within 900 ft (274 m) of the station.</p>
<p><b>12<sup>th</sup> Street/City Center</b> - Niles/I-880 Alignment Alternative</p>	<p>This station would directly connect with BART and would have good freeway access. The 12<sup>th</sup> Street station would have high connectivity, as it is located in the heart of downtown Oakland where many potential HST passengers could walk to the station. The 12<sup>th</sup> Street City Center BART station is also a transfer station, providing superior connectivity to the regional rail transit system. Sensitivity analysis on the Altamont Pass (the network alternative serving Oakland and San Jose) resulted in a 2.7% increase in ridership (over 2.4 million passengers per year) as compared to using the West Oakland terminus and a 1.5% increase in revenue. In contrast, sensitivity analysis on the Pacheco Pass for the 12<sup>th</sup> Street/City Center option resulted in a 0.7% decrease in ridership and 2.5% decrease in revenue. The 12<sup>th</sup> Street/City Center option has more constructability issues than the Oakland West site.</p> <p>The 12<sup>th</sup> Street station is estimated to cost \$611 million. The 3.17-mi (5.10-km) (cost) alignment between 29<sup>th</sup> Street north of the Oakland Coliseum and 12<sup>th</sup> Street is estimated to cost \$426 million (not including station, parking, or any associated right-of-way). The 12<sup>th</sup> Street site would be in a deep tunnel under the 12<sup>th</sup> Street BART station and would have a low ranking for potential land-use compatibility conflicts and presence of minority populations in the vicinity of the station area.</p> <p><b>Environmental Issues</b></p> <p><b>Traffic:</b> 2030 No HST: V/C =0.45; LOS =A  2030 HST (Pacheco): V/C =0.53; LOS =B  2030 HST (Altamont): V/C =0.53; LOS =B</p> <p><b>Parking Space Demand:</b> (Pacheco): N/A; (Altamont): N/A</p> <p><b>Land Use/Environmental Justice:</b> Compatible with 12<sup>th</sup> Street/City Center BART Station, civic center, and high-intensity commercial uses associated with Downtown Oakland. Consistent with plans for transit oriented district. Station would be constructed at grade. Potential for impacts is medium as percentages of environmental justice</p>

Station Name (Alignment)	Discussion
	<p>populations within station area exceed threshold.</p> <p><b>Farmlands:</b> No farmland resources were identified at this station location.</p> <p><b>Cultural Resources and Paleontological Resources:</b> No known cultural resources were identified within the area of potential effects for this station site. This station site was identified as having a moderate sensitivity for cultural resources.</p> <p><b>Hydrology and Water Resources:</b> This station site has the potential to impact 4.8 ac (1.94 ha) of groundwater.</p> <p><b>Biological Resources Including Wetlands:</b> No special-status plant or wildlife species were identified for this site.</p> <p><b>Faults:</b> None</p> <p><b>Section 4(f) and 6(f) Resources:</b> No 4(f) or 6(f) resources within 900 ft (274 m) of the station.</p>
<b>Southern Alameda County</b>	
<p><b>Union City (BART) - Niles/I-880</b> Alignment Alternative</p>	<p>This station location would offer the highest level of connectivity for south Alameda County. The Union City station would connect to BART, Capitol Corridor, and AC Transit and is expected to have similar ridership potential as the Fremont Warm Springs option. It would have low construction issues and low potential minority population impacts, and is estimated to cost \$69.9 million.</p> <p><b>Environmental Issues</b></p> <p><b>Traffic:</b> 2030 No HST: V/C =0.55; LOS =A  2030 HST (Pacheco): V/C =0.67; LOS =B  2030 HST (Altamont): V/C =0.67; LOS =B</p> <p><b>Parking Space Demand: (Pacheco):</b> 3,000 - 3,900; <b>(Altamont):</b> 1,300 – 1,800</p> <p><b>Land Use/Environmental Justice:</b> Compatible with Union City BART Station and industrial and commercial uses. Consistent with plans for development of a regional intermodal facility and research and development campus. Station constructed near Union City BART Station. Potential for impacts is medium as percentages of environmental justice populations within station area exceed threshold.</p> <p><b>Farmlands:</b> No farmland resources were identified at this station location.</p> <p><b>Cultural Resources and Paleontological Resources:</b> No known cultural resources were identified within the area of potential effects for this station site. This station site was identified as having a low sensitivity for cultural resources but a high sensitivity for paleontological resources.</p> <p><b>Hydrology and Water Resources:</b> This station site has the potential to impact 1.1 ac (0.45 ha) of floodplain, 273 linear ft (83.2 linear m) of streams, and 56 ac (22.6 ha) of groundwater.</p> <p><b>Biological Resources Including Wetlands:</b> No special-status plant or wildlife species were identified for this site.</p> <p><b>Faults:</b> None</p> <p><b>Section 4(f) and 6(f) Resources:</b> One resource, Charles F. Kennedy Park, within 900 ft (274 m) of the station.</p>



Station Name (Alignment)	Discussion
<b>Union City (Shinn) – Trans Bay Crossing – Dumbarton Alignment Alternatives</b>	<p>There are no current plans for this site to be a multi-modal hub station. This station location would less connectivity and accessibility than either the Union City or Fremont Warm Springs station options – and is therefore expected to have somewhat less ridership potential. There are considerable constructability issues at this site. Estimated cost is \$310 million.</p> <p><b>Environmental Issues</b></p> <p><b>Traffic:</b> 2030 No HST: V/C =0.46; LOS =A  2030 HST (Pacheco): N/A  2030 HST (Altamont): V/C =0.49; LOS =A</p> <p><b>Parking Space Demand:</b> (Pacheco): N/A; (Altamont): 1,300 – 1,800</p> <p><b>Land Use/Environmental Justice:</b> Highly compatible with industrial uses. Low compatibility with single-family residential uses. New station constructed outside existing transportation right-of-way. Potential for impacts is high as percentages of environmental justice populations within station area exceed threshold.</p> <p><b>Farmlands:</b> No farmland resources were identified at this station location.</p> <p><b>Cultural Resources and Paleontological Resources:</b> No known cultural resources were identified within the area of potential effects for this station site. This station site was identified as having a low sensitivity for cultural resources.</p> <p><b>Hydrology and Water Resources:</b> This station site is not anticipated to result in impacts on hydrology or water resources.</p> <p><b>Biological Resources Including Wetlands:</b> No special-status plant or wildlife species were identified for this site.</p> <p><b>Faults:</b> None</p> <p><b>Section 4(f) and 6(f) Resources:</b> One resource, Shinn Memorial Park, within 450 ft (137 m) of the station.</p>
<b>Fremont (Warm Springs) – Niles/I-880 Alignment Alternative</b>	<p>The Warm Springs station would have good access to the I-880 freeway, a potential direct connection to a future BART station and AC Transit. Ridership forecasts estimate 377 thousand total boardings and alightings annually by 2030 for the Altamont Pass “Base” network alternative. The Warm Springs station is estimated to cost \$157 million.</p> <p><b>Environmental Issues</b></p> <p><b>Traffic:</b> 2030 No HST: V/C =0.46; LOS =A  2030 HST (Pacheco): N/A  2030 HST (Altamont): V/C =0.47; LOS =A</p> <p><b>Parking Space Demand:</b> (Pacheco): N/A; (Altamont): 1,300 – 1,800</p> <p><b>Land Use/Environmental Justice:</b> Compatible with existing industrial and transportation uses. Consistent with plans for future BART station. New station constructed outside of existing transportation right-of-way. Potential for impacts is medium as percentages of environmental justice populations within station area exceed threshold.</p> <p><b>Farmlands:</b> No farmland resources were identified at this station location.</p> <p><b>Cultural Resources and Paleontological Resources:</b> No known cultural resources were identified within the area</p>

Station Name (Alignment)	Discussion
	<p>of potential effects for this station site. This station site was identified as having a low sensitivity for cultural resources but a high sensitivity for paleontological resources.</p> <p><b>Hydrology and Water Resources:</b> This station site has the potential to impact 81.3 ac (32.9 ha) of groundwater.</p> <p><b>Biological Resources Including Wetlands:</b> No special-status plant or wildlife species were identified for this site.</p> <p><b>Faults:</b> None</p> <p><b>Section 4(f) and 6(f) Resources:</b> No 4(f) or 6(f) resources within 900 ft (274 m) of the station.</p>
<b>Southern Santa Clara County</b>	
<p><b>Gilroy (Caltrain) - Pacheco Pass</b> Alignment Alternative</p>	<p>Southern Santa Clara County would be served by a station at either Gilroy or Morgan Hill. Both of these potential stations would be at Caltrain commuter rail station locations. The Gilroy station is about 10 mi (16 km) south of Morgan Hill and therefore provides better connectivity and travel times and less access costs to the Santa Cruz, Monterey/Carmel, and Salinas markets. Ridership forecasts estimate 1.7 – 2.3 million total boardings and alightings annually by 2030 for the Pacheco Pass “Base” network alternative</p> <p>The Gilroy and Morgan Hill station options would have similar costs, construction issues, and operational issues, all of which were ranked as medium potential impacts. Both station options would be expected to have low potential environmental impacts; however, the Gilroy station site is located in a 100-yr floodplain and would have high potential floodplain impacts. The Gilroy aerial station option is estimated to cost \$148 million<sup>34</sup>.</p> <p><b>Environmental Issues</b></p> <p><b>Traffic:</b> 2030 No HST: V/C =0.67; LOS =B  2030 HST (Pacheco): V/C =0.74; LOS =C  2030 HST (Altamont): N/A</p> <p><b>Parking Space Demand: (Pacheco):</b> 2,800 – 3,800; <b>(Altamont):</b> N/A</p> <p><b>Land Use/Environmental Justice:</b> Highly compatible with existing Gilroy Caltrain station and commercial uses. Low compatibility with single-family residential use. Consistent with policies for development of a multi-modal transit center. Station constructed at the Gilroy Caltrain station. Potential for impacts is medium as percentages of environmental justice populations exceed thresholds.</p> <p><b>Farmlands:</b> No farmland resources were identified at this station location.</p> <p><b>Cultural Resources and Paleontological Resources:</b> No known cultural resources were identified within the area of potential effects for this station site. This station site was identified as having a low sensitivity for cultural resources.</p> <p><b>Hydrology and Water Resources:</b> This station site has the potential to impact 40.1 ac (16.23 ha) of groundwater.</p> <p><b>Biological Resources Including Wetlands:</b> One special-status plant species, showy Indian clover, was identified for this site.</p>

<sup>34</sup> Costs are reduced because of lower proposed speed for station stopping tracks, which would require less infrastructure and right-of-way.

Station Name (Alignment)	Discussion
	<p><b>Faults:</b> None</p> <p><b>Section 4(f) and 6(f) Resources:</b> No 4(f) or 6(f) resources within 900 ft (274 m) of the station.</p>
<p><b>Morgan Hill (Caltrain) - Pacheco Pass Alignment Alternative</b></p>	<p>Southern Santa Clara County would be potentially served by a station at Morgan Hill. This station would be at a Caltrain commuter rail station location. This site is expected to have considerably less ridership potential than the Gilroy site. A sensitivity analysis on the Pacheco Pass "Base" forecast with both Morgan Hill and Gilroy stations resulted in over twice as many riders using the Gilroy station option. The Morgan Hill (Caltrain) station option is estimated to cost \$285 million.</p> <p><b>Environmental Issues</b></p> <p><b>Traffic:</b> 2030 No HST: V/C =0.59; LOS =A  2030 HST (Pacheco): V/C =0.65; LOS =B  2030 HST (Altamont): N/A</p> <p><b>Parking Space Demand: (Pacheco):</b> 1,400 - 1,500; <b>(Altamont):</b> 1,400 – 1,500</p> <p><b>Land Use/Environmental Justice:</b> Compatible with Morgan Hill Caltrain station and commercial uses. Consistent with plans for development of multi-modal transit transfer center. Potential for impacts is low as percentages of environmental justice populations are lower than the thresholds.</p> <p><b>Farmlands:</b> No farmland resources were identified at this station location.</p> <p><b>Cultural Resources and Paleontological Resources:</b> No known cultural resources were identified within the area of potential effects for this station site. This station site was identified as having a low sensitivity for cultural resources.</p> <p><b>Hydrology and Water Resources:</b> This station site has the potential to impact 11 ac (4.45 ha) of groundwater.</p> <p><b>Biological Resources Including Wetlands:</b> No special-status plant or wildlife species were identified for this site.</p> <p><b>Faults:</b> None</p> <p><b>Section 4(f) and 6(f) Resources:</b> No 4(f) or 6(f) resources within 900 ft (274 m) of the station.</p>
<b>East Bay to Central Valley: Altamont Pass (Tri-Valley)</b>	
<p><b>Pleasanton (I-680/Bernal Rd) – I-580/UPRR, Patterson Pass/UPRR, and UPRR Alignment Alternatives</b></p>	<p>This station could provide a high level of connectivity to Regional Rail service such as the existing ACE trains. This location provides convenient access to I-680 and I-580. Ridership forecasts estimate 4.2 – 5.5 million total boardings and alightings annually by 2030 for the Pleasanton (I-680/Bernal Rd) site using the Altamont Pass "Base" network alternative. The station is estimated to cost \$72.6 million.</p> <p><b>Environmental Issues</b></p> <p><b>Traffic:</b> 2030 No HST: V/C =0.53; LOS =A  2030 HST (Pacheco): N/A  2030 HST (Altamont): V/C =0.70; LOS =C</p> <p><b>Parking Space Demand: (Pacheco):</b> N/A; <b>(Altamont):</b> 6,900 - 9,100</p> <p><b>Land Use/Environmental Justice:</b> Incompatible with single-family residential use. Medium compatibility with</p>

Station Name (Alignment)	Discussion
	<p>nearby schools and community parks. Moderately consistent with plans for adjacent parks, athletics fields and public utilities. Compatible with existing ACE station. Potential for impacts is low as percentages of environmental justice populations are lower than the thresholds.</p> <p><b>Farmlands:</b> No farmland resources were identified at this station location.</p> <p><b>Cultural Resources and Paleontological Resources:</b> No known cultural resources were identified within the area of potential effects for this station site. This station site was identified as having a low sensitivity for cultural resources.</p> <p><b>Hydrology and Water Resources:</b> This station site has the potential to impact 10.9 ac (4.41 ha) of groundwater.</p> <p><b>Biological Resources Including Wetlands:</b> No special-status plant or wildlife species were identified for this site.</p> <p><b>Faults:</b> None</p> <p><b>Section 4(f) and 6(f) Resources:</b> No 4(f) or 6(f) resources within 900 ft (274 m) of the station.</p>
<p><b>Pleasanton (BART) – I-680/I-580/UPRR Alignment Alternative</b></p>	<p>This station would provide a high level of connectivity to the BART system at the existing Dublin/Pleasanton BART Station. This location provides convenient access to I-680 and I-580. There would be significant constructability issues implementing this HST station over an existing BART station in the freeway median and longer total HST travel times than other options serving the Tri-Valley. Sensitivity analysis forecast 1.6% less total ridership (about 1.4 million fewer annual passengers) for an Altamont Pass “Base” network alternative using the Pleasanton BART station option (and the I-680/I-580/UPRR alignment) rather than the Pleasanton Bernal/I-680 station option to serve the Tri-Valley. The station is estimated to cost \$317 million.</p> <p><b>Environmental Issues</b></p> <p><b>Traffic:</b> 2030 No HST: V/C =0.44; LOS =A  2030 HST (Pacheco): N/A  2030 HST (Altamont): V/C =0.46; LOS =A</p> <p><b>Parking Space Demand:</b> (Pacheco): N/A; (Altamont): 6,900 - 9,100</p> <p><b>Land Use/Environmental Justice:</b> Compatible with Dublin/Pleasanton BART station and existing transit corridor. Consistent with planned mixed-use development around BART station. Potential for impacts is low as percentages of environmental justice populations are lower than the thresholds.</p> <p><b>Farmlands:</b> No farmland resources were identified at this station location.</p> <p><b>Cultural Resources and Paleontological Resources:</b> No known cultural resources were identified within the area of potential effects for this station site. This station site was identified as having a low sensitivity for cultural resources.</p> <p><b>Hydrology and Water Resources:</b> This station site has the potential to impact 2.4 ac (0.97 ha) of floodplain, 438 linear ft (133.5 linear m) of streams, and 16.2 ac (6.56 ha) of groundwater.</p> <p><b>Biological Resources Including Wetlands:</b> No special-status plant or wildlife species were identified for this site.</p> <p><b>Faults:</b> None</p>

Station Name (Alignment)	Discussion
<b>Livermore (Downtown) – Patterson Pass/UPRR and UPRR Alignment Alternatives</b>	<p><b>Section 4(f) and 6(f) Resources:</b> No 4(f) or 6(f) resources within 900 ft (274 m) of the station.</p> <p>This station could provide a high level of connectivity to Regional Rail service such as the existing ACE trains, however Livermore stations locations are not as conveniently located for automobile accessibility as the Pleasanton station sites for a majority of the potential Tri-Valley and Contra Costa HST passengers. The Bay Area Regional Rail planning effort is considering a potential BART extension to Livermore. Sensitivity analysis forecast 1.6% less total ridership (about 1.4 million fewer annual passengers) for an Altamont Pass “Base” network alternative using the Livermore (Downtown) station option rather than the Pleasanton Bernal/I-680 station option to serve the Tri-Valley. The station is estimated to cost \$73.2 million.</p> <p><b>Environmental Issues</b></p> <p><b>Traffic:</b> 2030 No HST: V/C =0.82; LOS =D  2030 HST (Pacheco): N/A  2030 HST (Altamont): V/C =1.10; LOS =F</p> <p><b>Parking Space Demand:</b> (Pacheco): N/A; (Altamont): 6,900 - 9,100</p> <p><b>Land Use/Environmental Justice:</b> Compatible with industrial and transportation uses. Consistent with policies for development of mixed-use downtown development. Potential for impacts is low as percentages of environmental justice populations are lower than the thresholds.</p> <p><b>Farmlands:</b> No farmland resources were identified at this station location.</p> <p><b>Cultural Resources and Paleontological Resources:</b> No known cultural resources were identified within the area of potential effects for this station site. This station site was identified as having a low sensitivity for cultural resources.</p> <p><b>Hydrology and Water Resources:</b> This station site has the potential to impact 13.3 ac (5.38 ha) of groundwater.</p> <p><b>Biological Resources Including Wetlands:</b> No special-status plant or wildlife species were identified for this site.</p> <p><b>Faults:</b> None</p>
<b>Livermore (I-580) – I-680/I580/UPRR and I-580/UPRR Alignment Alternatives</b>	<p>This station would provide direct access to vehicles traveling along the I-580 freeway in the Tri-Valley area, however this Livermore station location is less conveniently located for automobile accessibility for a majority of the potential Tri-Valley and Contra Costa HST passengers than the Pleasanton station options. The Bay Area Regional Rail planning effort is considering a potential BART extension to Livermore. Intercity ridership forecasts estimate similar total boardings and alightings as for the Livermore (Downtown) site. The station is estimated to cost \$152 million.</p> <p><b>Environmental Issues</b></p> <p><b>Traffic:</b> 2030 No HST: V/C =1.07; LOS =F  2030 HST (Pacheco): N/A  2030 HST (Altamont): V/C =1.38; LOS =F</p> <p><b>Parking Space Demand:</b> (Pacheco): N/A; (Altamont): 6,900 - 9,100</p> <p><b>Land Use/Environmental Justice:</b> Compatible with existing transportation uses. Consistent with plans for neighborhood commercial land uses. Potential for impacts is low as percentages of environmental justice populations</p>

Station Name (Alignment)	Discussion
	<p>are lower than the thresholds.</p> <p><b>Farmlands:</b> No farmland resources were identified at this station location.</p> <p><b>Cultural Resources and Paleontological Resources:</b> No known cultural resources were identified within the area of potential effects for this station site. This station site was identified as having a low sensitivity for cultural resources but a high sensitivity for paleontological resources.</p> <p><b>Hydrology and Water Resources:</b> This station site has the potential to impact 1.7 ac (0.69 ha) of floodplain, 174 linear ft (53 linear m) of streams, 15.9 ac (6.43 ha) of groundwater, and to encounter 8.3 ac (3.36 ha) of soils susceptible to erosion.</p> <p><b>Biological Resources Including Wetlands:</b> No special-status plant or wildlife species were identified for this site. This station site has the potential to impact 1.02 ac (0.41 ha) of wetlands.</p> <p><b>Faults:</b> None</p> <p><b>Section 4(f) and 6(f) Resources:</b> No 4(f) or 6(f) resources within 900 ft (274 m) of the station.</p>
<p><b>Livermore (Greenville/UPRR) –</b> Patterson Pass/UPRR and UPRR Alignment Alternatives</p>	<p>This station could provide a high level of connectivity to Regional Rail service such as the existing ACE trains. This station location is on the eastern fringe of Livermore and is not as accessible to the area's population as other potential sites and is the least conveniently located for automobile accessibility for a majority of the potential Tri-Valley and Contra Costa HST passengers. The Bay Area Regional Rail planning effort is considering a potential BART extension to Livermore. Intercity ridership forecasts estimated to be slightly less than the Livermore (Downtown) site. The station is estimated to cost \$72.6 million.</p> <p><b>Environmental Issues</b></p> <p><b>Traffic:</b> 2030 No HST: V/C =0.44; LOS =A  2030 HST (Pacheco): N/A  2030 HST (Altamont): V/C =0.71; LOS =C</p> <p><b>Parking Space Demand:</b> (Pacheco): N/A; (Altamont): 6,900 - 9,100</p> <p><b>Land Use/Environmental Justice:</b> Compatible with industrial uses. Consistent with proposed industrial use. Potential for impacts is low as percentages of environmental justice populations are lower than the thresholds.</p> <p><b>Farmlands:</b> No farmland resources were identified at this station location.</p> <p><b>Cultural Resources and Paleontological Resources:</b> No known cultural resources were identified within the area of potential effects for this station site. This station site was identified as having a low sensitivity for cultural resources.</p> <p><b>Hydrology and Water Resources:</b> This station site has the potential to impact 12.9 ac (5.22 ha) of groundwater.</p> <p><b>Biological Resources Including Wetlands:</b> No special-status plant or wildlife species were identified for this site.</p> <p><b>Faults:</b> None</p> <p><b>Section 4(f) and 6(f) Resources:</b> No 4(f) or 6(f) resources within 900 ft (274 m) of the station.</p>



Station Name (Alignment)	Discussion
<b>Livermore (Greenville/I-580) – I-680/I580/UPRR and I-580/UPRR Alignment Alternatives</b>	<p>This station would provide direct access to vehicles traveling along the I-580 freeway in the Tri-Valley area. This station location is on the eastern fringe of Livermore and is not as accessible to the area's population as other potential sites and is the least conveniently located for automobile accessibility for a majority of the potential Tri-Valley and Contra Costa HST passengers. The Bay Area Regional Rail planning effort is considering a potential BART extension to Livermore. Intercity ridership forecasts estimated to be slightly less than the Livermore (Downtown) site. The station is estimated to cost \$160 million.</p> <p><b>Environmental Issues</b></p> <p><b>Traffic:</b> 2030 No HST: V/C =0.50; LOS =A  2030 HST (Pacheco): N/A  2030 HST (Altamont): V/C =0.80; LOS =C</p> <p><b>Parking Space Demand:</b> (Pacheco): N/A; (Altamont): 6,900 - 9,100</p> <p><b>Land Use/Environmental Justice:</b> Compatible with industrial uses. Incompatible with existing and proposed agricultural uses. Not consistent with proposed agricultural use. Potential for impacts is low as percentages of environmental justice populations are lower than the thresholds.</p> <p><b>Farmlands:</b> No farmland resources were identified at this station location.</p> <p><b>Cultural Resources and Paleontological Resources:</b> No known cultural resources were identified within the area of potential effects for this station site. This station site was identified as having a low sensitivity for cultural resources but a high sensitivity for paleontological resources.</p> <p><b>Hydrology and Water Resources:</b> This station site has the potential to impact 13.8 ac (5.58 ha) of groundwater and to encounter 8.2 ac (3.32 ha) of soils susceptible to erosion.</p> <p><b>Biological Resources Including Wetlands:</b> No special-status plant or wildlife species were identified for this site. This station site has the potential to impact 1.07 ac (0.43 ha) of wetlands.</p> <p><b>Faults:</b> None</p> <p><b>Section 4(f) and 6(f) Resources:</b> No 4(f) or 6(f) resources within 900 ft (274 m) of the station.</p>
<b>East Bay to Central Valley: Altamont Pass (Tracy)</b>	
<b>Tracy (Downtown) – Tracy Downtown (BNSF Connection) and Tracy Downtown (UPRR Connection) Alignment Alternatives</b>	<p>This station would be consistent with City of Tracy Redevelopment Plans for Transit Oriented Development and an intermodal station in downtown Tracy. Regional Rail planning is investigating the potential to use this site as the Tracy station for a future improved ACE service. Ridership forecasts estimate 0.8 – 1.1 million total boardings and alightings annually by 2030 for the Tracy (Downtown) site using the Altamont Pass “Base” network alternative. The station is estimated to cost \$310 million.</p> <p><b>Environmental Issues</b></p> <p><b>Traffic:</b> 2030 No HST: V/C =0.64; LOS =B  2030 HST (Pacheco): N/A  2030 HST (Altamont): V/C =0.74; LOS =C</p> <p><b>Parking Space Demand:</b> (Pacheco): N/A; (Altamont): 1,200 - 1,700</p>

Station Name (Alignment)	Discussion
	<p><b>Land Use/Environmental Justice:</b> Highly consistent with planned downtown mixed-use development. Potential for impacts is low as percentages of environmental justice populations are lower than the thresholds.</p> <p><b>Farmlands:</b> No farmland resources were identified at this station location.</p> <p><b>Cultural Resources and Paleontological Resources:</b> No known cultural resources were identified within the area of potential effects for this station site. This station site was identified as having a low sensitivity for cultural resources.</p> <p><b>Hydrology and Water Resources:</b> This station site has the potential to impact 11.8 ac (4.78 ha) of groundwater.</p> <p><b>Biological Resources Including Wetlands:</b> No special-status plant or wildlife species were identified for this site.</p> <p><b>Faults:</b> None</p> <p><b>Section 4(f) and 6(f) Resources:</b> No 4(f) or 6(f) resources within 900 ft (274 m) of the station.</p>
<p><b>Tracy (ACE)</b> – Tracy ACE (BNSF Connection) and Tracy ACE (UPRR Connection) Alignment Alternatives</p>	<p>This station could provide a high level of connectivity to Regional Rail service such as the existing ACE trains. This site is a rural area outside the current urban area of Tracy. Sensitivity analysis forecasts about 0.2% less total ridership (about 190 thousand passengers annually by 2030) for the Altamont Pass “Base” network alternative using the Tracy ACE station rather than the Tracy Downtown option. The station is estimated to cost \$315 million.</p> <p><b>Environmental Issues</b></p> <p><b>Traffic:</b> <b>2030 No HST:</b> V/C =0.02; LOS =B  <b>2030 HST (Pacheco):</b> N/A  <b>2030 HST (Altamont):</b> V/C =0.26; LOS =A</p> <p><b>Parking Space Demand:</b> <b>(Pacheco):</b> N/A; <b>(Altamont):</b> 1,200 - 1,700</p> <p><b>Land Use/Environmental Justice:</b> Compatible with industrial and agricultural uses. Consistent with policies to encourage improved regional rail service. Potential for impacts is low as percentages of environmental justice populations are lower than the thresholds.</p> <p><b>Farmlands:</b> No farmland resources were identified at this station location.</p> <p><b>Cultural Resources and Paleontological Resources:</b> No known cultural resources were identified within the area of potential effects for this station site. This station site was identified as having a low sensitivity for cultural resources.</p> <p><b>Hydrology and Water Resources:</b> This station site has the potential to impact 15 ac (6.07 ha) of groundwater.</p> <p><b>Biological Resources Including Wetlands:</b> No special-status plant or wildlife species were identified for this site. This station site has the potential to impact 0.08 ac (0.03 ha) of wetlands.</p> <p><b>Faults:</b> None</p> <p><b>Section 4(f) and 6(f) Resources:</b> No 4(f) or 6(f) resources within 900 ft (274 m) of the station.</p>

Station Name (Alignment)	Discussion
<b>Central Valley (Modesto)</b>	
<b>Modesto (Downtown) – BNSF-UPRR, UPRR, and UPRR-BNSF Alignment Alternatives</b>	<p>The downtown Modesto station maximizes connectivity to downtown Modesto, and provides convenient access to SR-99 and good bus transit access. This option through downtown Modesto would have considerable construction issues as compared with the Amtrak Briggsmore site. Ridership forecasts estimate 1.589 million total boardings and alightings annually by 2030 for the Modesto HST station (slightly higher than the Amtrak Briggsmore option) for the Altamont Pass “Base” network alternative. Sensitivity analysis forecast a 0.3% increase in total ridership (about 280 thousand passengers annually by 2030) for the Pacheco Pass “Base” network alternative using Modesto (Downtown) rather than Briggsmore (Amtrak). The station is estimated to cost \$71.4 million.</p> <p><b>Environmental Issues</b></p> <p><b>Traffic:</b> 2030 No HST: V/C =0.90; LOS =D  2030 HST (Pacheco): V/C =0.92; LOS =E  2030 HST (Altamont): V/C =0.92; LOS =E</p> <p><b>Parking Space Demand: (Pacheco): 2,700 - 4,000; (Altamont): 2,800 - 4,100</b></p> <p><b>Land Use/Environmental Justice:</b> Compatible with industrial and commercial uses. Potential for impacts is low as percentages of environmental justice populations are lower than the thresholds.</p> <p><b>Farmlands:</b> No farmland resources were identified at this station location.</p> <p><b>Cultural Resources and Paleontological Resources:</b> No known cultural resources were identified within the area of potential effects for this station site. This station site was identified as having a low to medium to high sensitivity for cultural resources.</p> <p><b>Hydrology and Water Resources:</b> This station site has the potential to impact 8.5 ac (3.44 ha) of groundwater.</p> <p><b>Biological Resources Including Wetlands:</b> One special-status wildlife species, the valley elderberry longhorn beetle, was identified for this site.</p> <p><b>Faults:</b> None</p> <p><b>Section 4(f) and 6(f) Resources:</b> No 4(f) or 6(f) resources within 900 ft (274 m) of the station.</p>
<b>Briggsmore (Amtrak) – BNSF, BNSF Castle, BNSF-UPRR Alignment Alternatives</b>	<p>The Amtrak Briggsmore station is about 5 mi (8 km) east of downtown Modesto. This is the site of a new Amtrak station with direct connection to Amtrak services and bus services. Ridership forecasts estimate 1.29 million total boardings and alightings annually by 2030 for the Amtrak Briggsmore site using the Pacheco Pass “Base” network alternative. Sensitivity analysis forecast about 0.4% total ridership less (about 300 thousand passengers annually by 2030) than the Altamont Pass “Base” network alternative using Briggsmore (Amtrak) rather than Modesto (Downtown). The station is estimated to cost \$71.4 million.</p> <p><b>Environmental Issues</b></p> <p><b>Traffic:</b> 2030 No HST: V/C =0.88; LOS =D  2030 HST (Pacheco): V/C =0.91; LOS =E  2030 HST (Altamont): V/C =0.91; LOS =E</p> <p><b>Parking Space Demand: (Pacheco): 2,700 - 4,000; (Altamont): 2,800 - 4,100</b></p>

Station Name (Alignment)	Discussion
	<p><b>Land Use/Environmental Justice:</b> Incompatible with single-family residential and agricultural uses. Potential for impacts is low as percentages of environmental justice populations are lower than the thresholds.</p> <p><b>Farmlands:</b> No farmland resources were identified at this station location.</p> <p><b>Cultural Resources and Paleontological Resources:</b> No known cultural resources were identified within the area of potential effects for this station site. This station site was identified as having a low sensitivity for cultural resources.</p> <p><b>Hydrology and Water Resources:</b> This station site has the potential to impact 14.2 ac (5.75 ha) of groundwater.</p> <p><b>Biological Resources Including Wetlands:</b> No special-status plant or wildlife species were identified for this site.</p> <p><b>Faults:</b> None</p> <p><b>Section 4(f) and 6(f) Resources:</b> No 4(f) or 6(f) resources within 900 ft (274 m) of the station.</p>
<b>Central Valley (Merced)</b>	
<p><b>Merced (Downtown) – BNSF-UPRR, UPRR, and BNSF-UPRR Alignment Alternatives</b></p>	<p>The downtown Merced station is located near the city center and transit hub of Merced, has good access to SR-99 at the bus transit hub for Merced, and would have a higher level of connectivity than the Castle AFB site. Ridership forecasts estimate 627 – 872 thousand total boardings and alightings annually by 2030 for the Merced (Downtown) station option using the Pacheco Pass “Base” network alternative, and 671 thousand for the Altamont Pass “Base” network alternative. The downtown Merced option would have higher construction issues than the Castle AFB site, and four tracks would be needed through downtown Merced to accommodate express services. The station is estimated to cost \$71.4 million.</p> <p><b>Environmental Issues</b></p> <p><b>Traffic:</b> <b>2030 No HST:</b> V/C =1.15; LOS =F  <b>2030 HST (Pacheco):</b> V/C =1.16; LOS =F  <b>2030 HST (Altamont):</b> V/C =1.16; LOS =F</p> <p><b>Parking Space Demand: (Pacheco):</b> 1,000 - 1,300; <b>(Altamont):</b> 1,200 - 1,600</p> <p><b>Land Use/Environmental Justice:</b> Compatible with commercial use. Incompatible with single-family residential use. Potential for impacts is low as percentages of environmental justice populations are lower than the thresholds.</p> <p><b>Farmlands:</b> No farmland resources were identified at this station location.</p> <p><b>Cultural Resources and Paleontological Resources:</b> No known cultural resources were identified within the area of potential effects for this station site. This station site was identified as having a low to medium sensitivity for cultural resources.</p> <p><b>Hydrology and Water Resources:</b> This station site has the potential to impact 11.7 ac (4.73 ha) of floodplain.</p> <p><b>Biological Resources Including Wetlands:</b> One special-status wildlife species, the giant garter snake, was identified for this site.</p> <p><b>Noise:</b> Although express trains would run through Merced at speeds up to 220 mph (354 kph), potential noise impacts through Merced are expected to be moderate because of mostly commercial and industrial land uses adjacent to the</p>

Station Name (Alignment)	Discussion
	<p>freight railroad. Many of the potential noise impacts could be offset by grade separating the adjacent freight services and eliminating horn noise from warning gates.</p> <p><b>Faults:</b> None</p> <p><b>Section 4(f) and 6(f) Resources:</b> No 4(f) or 6(f) resources within 900 ft (274 m) of the station.</p>
<p><b>Castle AFB – BNSF Castle, and UPRR-BNSF Castle Alignment Alternatives</b></p>	<p>This station would be consistent with City of Merced's Redevelopment Plans for Transit Oriented Development and an intermodal station in the Castle AFB. This site is about 7 mi (11 km) from downtown Merced but would provide easy access to the developing UC Merced campus via a new highway alignment along Bellevue Avenue. This option would have less connectivity and accessibility than the downtown Merced station option but is estimated to have similar HST ridership and revenue. The station is estimated to cost \$71.4 million.</p> <p><b>Environmental Issues</b></p> <p><b>Traffic:</b> <b>2030 No HST:</b> V/C =0.63; LOS =B  <b>2030 HST (Pacheco):</b> V/C =0.65; LOS =B  <b>2030 HST (Altamont):</b> V/C =0.65; LOS =B</p> <p><b>Parking Space Demand: (Pacheco):</b> 1,000 - 1,300; <b>(Altamont):</b> 1,200 - 1,600</p> <p><b>Land Use/Environmental Justice:</b> Compatible with industrial use and inactive Castle AFB. Incompatible with residential use. Potential for impacts is low as percentages of environmental justice populations are lower than the thresholds.</p> <p><b>Farmlands:</b> This station site would have the potential to impact up to 12 ac (4.86 ha) of prime farmland. Overall, this station would have the greatest potential impact on farmland of all the stations.</p> <p><b>Cultural Resources and Paleontological Resources:</b> No known cultural resources were identified within the area of potential effects for this station site. This station site was identified as having a low sensitivity for cultural resources.</p> <p><b>Hydrology and Water Resources:</b> This station site has the potential to impact 416 linear ft (126.8 linear m) of streams and canals including the Casad Lateral.</p> <p><b>Biological Resources Including Wetlands:</b> No special-status plant or wildlife species were identified for this site. The Casad Lateral extends through a portion of the site.</p> <p><b>Noise:</b> Would be about the same as the Merced (Downtown) option.</p> <p><b>Faults:</b> None</p> <p><b>Section 4(f) and 6(f) Resources:</b> No 4(f) or 6(f) resources within 900 ft (274 m) of the station.</p>